The UNESCO Courier

A window open on the world

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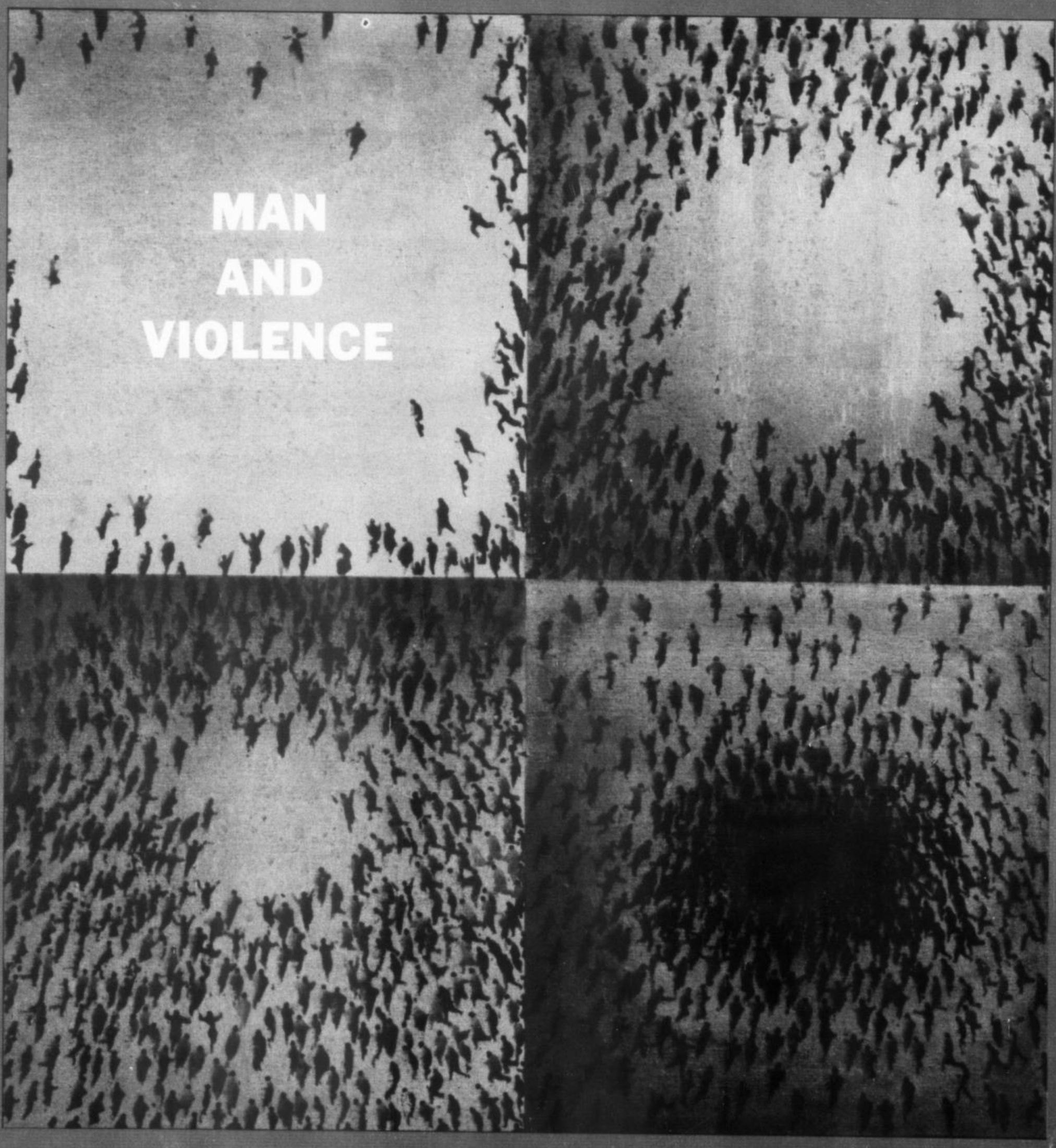

MAN AND VIOLENCE

Photo © Musée de l'Homme, Paris

TREASURES OF WORLD ART

46 Hawaii (U.S.)

Ancestor figure

This two-headed figure is a unique example of the rare stone carvings of Hawaii. Forty centimetres (16 in.) high, it is wrought from the dark basalt rock found in Pacific islands of volcanic origin. The statuette is thought to represent an ancestor figure of the Hawaiian people, "Te-ari' i-tino-nua" (the woman with two bodies), traditionally believed to have accompanied the first inhabitant of Hawaii on his epic voyage from Tahiti, over 2,000 miles away. The adventures of the voyage are recounted in a long Hawaiian poem. The pendant worn by the figure, made of walrus tusk and suspended by a loop woven from human hair, is a miniature version of a traditional Polynesian ornament.

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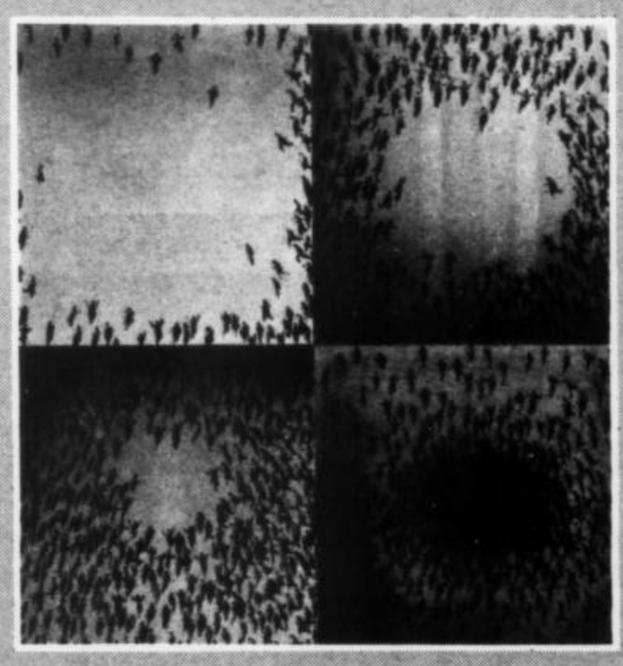

Cover

This month's cover is a painting by a young Spanish artist, Juan Genoves, whose work is a cry of anguish against human violence. Painting is a four-panel scene showing the clash of a seething crowd.
(See photo story page 18).

Photo courtesy Marlborough Fine Art, London

Homo sapiens, it would seem, is man's deadliest enemy. No vertebrate, not even the most ferocious of the carnivores, habitually kills members of its own species—with two exceptions... rats and men. Can it be that man is no better than the rat? That, as Konrad Lorenz and a number of his followers maintain, man is by instinct an aggressive creature, a born killer, and that it is this innate propensity to violence that accounts for individual and group aggression in man?

Last May, Unesco brought together at its headquarters in Paris a group of distinguished biologists, zoologists and other scientists from more than a dozen countries to face this question. Their answer: a unanimous and resounding "No!" Man is no killer by nature. Man does not possess an "aggressive instinct." What went on during this debate and some of the startling conclusions of recent scientific research in the field are the subject of the first part of this issue.

But there is another domain where the depredations of man have reached the hot danger point: the aggression of technological, industrial and urban man against his natural environment, against that thin layer of our planet that has come to be known as the Biosphere. But here too man has the answer within himself. For if we so will it, by our single and joint acts, there is still time to save our planet and life upon it from irreparable ruin.

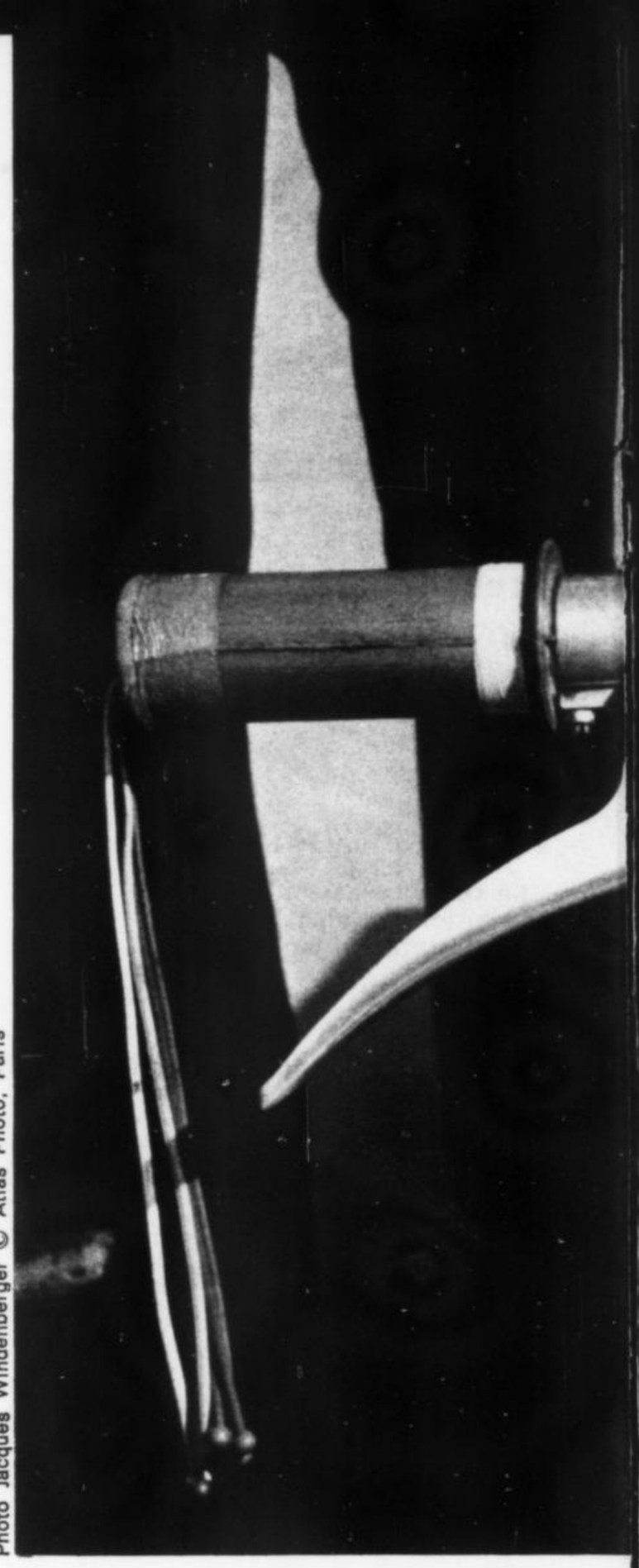

Photo Jacques Windenberger © Atlas Photo, Paris

UNDERSTANDING MAN'S AGGRESSIVENESS

by Dan Behrman

1. Instinct or learned misbehaviour?

DAN BEHRMAN, *author of "The New World of the Oceans" (Little, Brown and Co., Boston, U.S.A.) is a Unesco science writer.*

IS man chained to the wheel of instinct, condemned to fight tooth and nail, rocket and bomb until the end (easily foreseeable, if this is so) of his stay on earth? Or can his brain be taught to modify the violent behaviour that he needed as a hunting animal in a now-forgotten world?

The answer to the first question is No; to the second a hesitant qualified Yes. The questions and their answers came recently at one of the most unusual conferences that Unesco has ever held. Its purpose was to learn how far science has got towards understanding human aggressiveness and along what lines of research it should strike out in the future.

The conference was unusual in that it bore so little resemblance to a formal conference. At times, it was a conversation; at other times, a philosophical dialogue. It took on a life of its own, a rhythmic pace of give-and-take where any person at any time could be expected to come up with the unexpected. Those fortunate enough to watch it could not help but tell themselves that such an event gets right to the *raison d'être* of an organization like Unesco.

Eighteen scientists from fourteen countries spent a week together in one of Unesco's conference rooms. They talked about how to achieve peace of mind and, subsequently, the peace of nations on a site that represented a glimmer of hope in itself. As one of them remarked, Unesco coexists peacefully with the French Ecole Militaire across the way and it occupies land that once housed a cavalry barracks.

Their meeting was international, intercultural, interdisciplinary. They talked of mice and men, of how both behave under stress such as the strain of overcrowding. They talked of violent crime among new migrants to Baghdad, of police-stoning by students in Berkeley. They could speak at first hand of life on an Indonesian island, in an African valley peopled by chimpanzees, in the quiet old city of Budapest, in the turmoil of New York. They could talk of correcting misbehaviour in a child by spanking it, in a monkey by transmitting a signal to a radio set implanted in its brain.

The men and the one woman at this meeting were of bents so different and interests so diverse that none was preaching to the converted, yet all were close enough to find common ground for discussion.

CONTINUED NEXT PAGE

The first matter to discuss and settle was the biological basis of aggressiveness. If it was innate, then not much could be done about it, least of all by an international meeting. The view that aggressiveness is not only an instinct in man but that it is a good one because it makes the world go round has been put forth in popular writings that have acquired a huge following.

Even prime ministers these days talk of the "territorial imperative", one scientist observed sadly, as he expressed the wish that biologists who go more deeply into the behaviour of man and animals could write more clearly.

The consensus of the meeting was that aggressiveness is not instinctive. It may once have been useful, but in circumstances far different than those we experience today. On this issue, the most outspoken member of the meeting was Dr. Robert A. Hinde, director of animal behaviour study at the University of Cambridge, England. He attacked the notion that aggressive behaviour is "valuable" for the survival of man as a species.

"Man's cultural evolution takes place today in circumstances quite different from those of natural selection," said Dr. Hinde. "Is it the most aggressive individuals that our society wishes to perpetuate? Do we think that there is a correlation between strength and wisdom in man? It is certainly absent in monkeys...

"It has also been said that aggressiveness is needed to establish a hierarchical order in society. In this view, the presence of untouchables is needed as a release for aggressiveness. But has anyone asked the untouchables about this?"

A number of subtle distinctions had to be drawn, some along semantic lines. Aggressiveness may not be an "instinct", agreed Dr. Sherwood Washburn, professor of anthropology at the University of California at Berkeley, but it is very readily learnt. "Give a boy a rifle and he'll go out and hunt," he remarked. "This is built into us. Crowds are violent, armies are violent. Look at the Congo, look at Vietnam. It is easy for man to be extremely violent." Dr. Ali Kemal, professor of psychiatry at the University of Mustansiriah in Baghdad, disagreed: "I cannot agree that aggressiveness is learnt; it's as old as original sin."

On this issue, as on a number of others, the chairman of the meeting; Dr. David Hamburg, head of the psychiatry department of the Stanford University School of Medicine, in California, was able to bring apparently conflicting views together with it necessarily watering them down a lowest common denominator. Dr. Hamburg, a thoughtful man who could make very incisive statements very unaggressively, wondered aloud if much of man's biological equipment—and the violent behaviour that it generates—is not obsolete.

Several other speakers, beginning with Prof. Richard Hoggart, Unesco Assistant Director-General for Social Sciences, Human Sciences and Culture, who opened the meeting, pointed out that the world has changed, but man has not. He has not yet had time to evolve physically from man the hunter; yet hunting as a way of life has vanished from the face of the earth except in a few remote pockets. Dr. Hamburg put a time scale on this change to show how human evolution has been unable to keep up with the change from caveman to cityman.

Mammals appeared on earth 50 million years ago, hominids some 4 million years ago. Our own species is 40,000 years old, agriculture began about 8,000 years ago and the industrial revolution responsible for the shape of the modern world is but two centuries old, "only a moment in evolutionary time." Small wonder that man the hunter—who needed ten square miles of elbow-room per capita according to conclusions based on distribution of fossil remains—has so much trouble squeezing into factories, office buildings and cities.

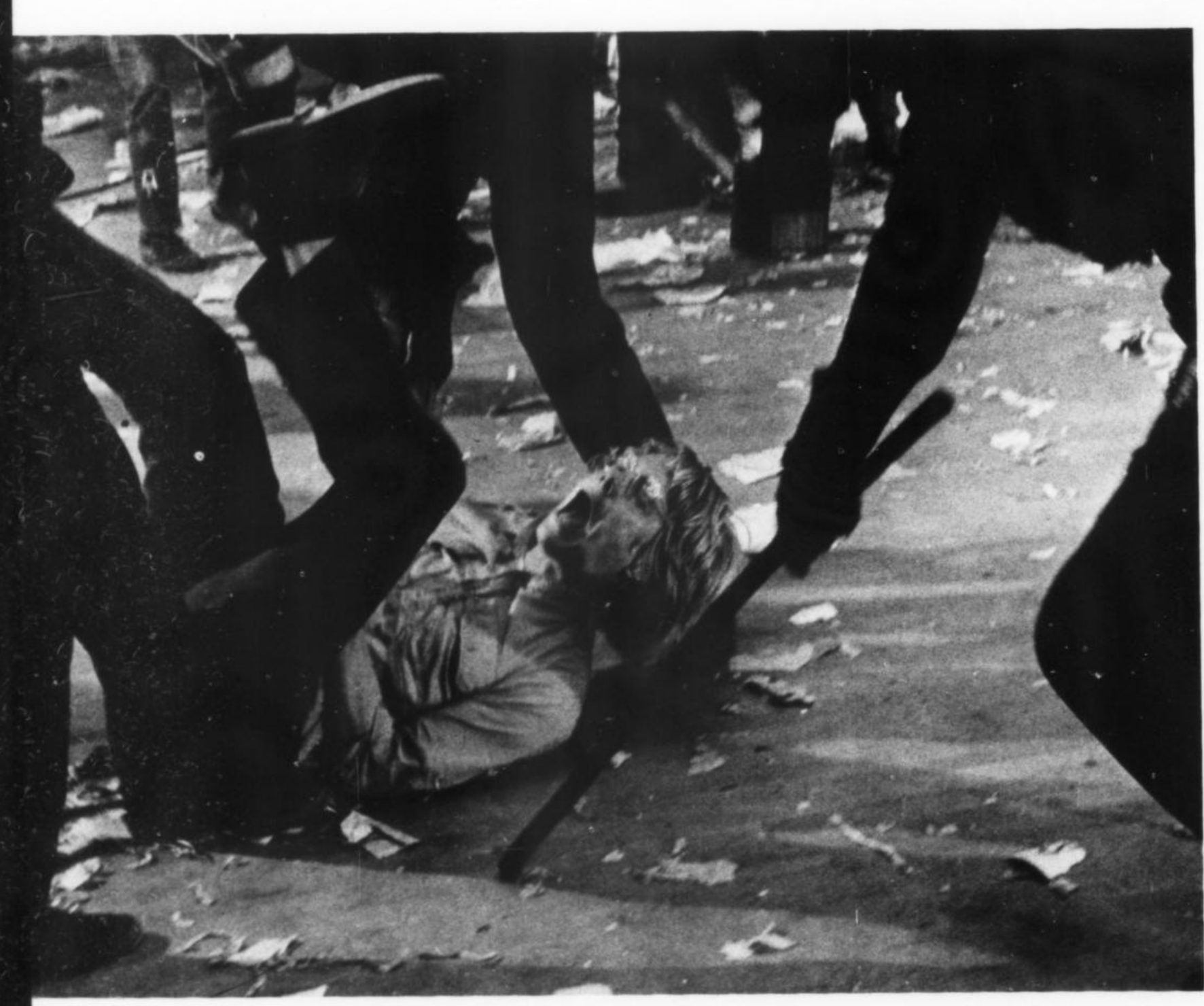

Photo Metro-Goldwyn-Mayer

Left, a pitched battle between police and students, a shot from a recent American film, "The Strawberry Statement", which dramatises the world-wide problem of today's conflict between youth and authority on the campus.

The photograph on the right is no Hollywood film shot. It was taken in a forest in Tanzania and shows a young male chimpanzee who has seized a club and is beating an insect on the ground. For the rest of this remarkable photo story see following pages.

2. Should we ape the chimpanzee?

IF man is not born instinctively aggressive, then why does he get that way? This question was the crux of the meeting and it was approached first from the viewpoint of ethology, the science of animal behaviour that seems to fall halfway between the stools of the social and the natural sciences. Let's say it's a social science of non-humans.

The most complete account of how animals act in their natural surroundings as compared to the artificial environment of a zoo or a laboratory came from Dr. Jane van Lawick-Goodall who has spent ten years observing chimpanzees at the Gombe Stream Research Centre in Tanzania. The chimps, she remarked, now take no more notice of her than they would of a stone, a tree . . . or a baboon. She can watch them from no more than a room's length away as they run the gamut of aggressive behaviour. This takes patience because chimpanzees can go for days without creating a single aggressive incident.

The repertory starts with a "low-intensity threat", a mere jerk of the head and a little cough, and extends right up to a big male hunching his shoulders, bristling his hair, stamping his feet, drumming on the buttresses of a tree, brandishing a branch or throwing stones. It was pointed out at the meeting that the mild range of animal threats may correspond to verbal aggression in humans.

Chimpanzees are masters of the art of brinkmanship, seldom going to the point of actual physical violence. Even when they do, said Dr. van Lawick-Goodall, they don't seem to come out with more than a few scratches or some lost handfuls of hair. Immediately after a clash that may see two animals rolling furiously down a slope, the antagonists are at peace. The victim can extend its hand, the aggressor will pat its head, and then they start to groom each other.

Dr. van Lawick-Goodall said that she had never seen chimpanzees fight to the death. Nor has she ever observed these lower animals forming groups to make war on each other.

The world that she observes is so civilized that its ruler rose to the top without even laying a hand on his subjects. She has watched the career of this leader, Mike, since 1964 when he was somewhat of a chump as a chimp, the butt of attacks by nearly all the other adult males. Then he picked up an empty paraffin can and began to drag it around. Soon he was rolling three cans through the area at full speed, making more noise than an express train, sending every other chimpanzee scurrying in frightful flight to the treetops. Mike has been the champ chimp ever since.

Aggressiveness appears in chimpanzees first of all if they are attacked. They rarely fight over food and then only if a much-liked item is in short supply. Frustration is another cause and it leads to redirected aggression: a young animal will attack an animal lower down on the dominance scale if it has been attacked by a higher-

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Photo Baron Hugo van Lawick © National Geographic Society

ranking member of the group. A male will attack a female in oestrus if she does not respond to his courtship. An individual that is different from the others will arouse enmity. Such was the case, Dr. van Lawick-Goodall remarked, of infants that had lost their mothers and of one young chimp that had been stricken with polio and could not use its legs.

The female of the species is less aggressive than the male but perhaps more dangerous after all. Dr. van Lawick-Goodall explained that male chimpanzees will fight and immediately forgive. A female may give way if attacked by a male, then go up to another male half an hour later and convince him to settle the score. Dr. van Lawick-Goodall remarked: "It's not fair to say that women do not play a role in the aggressive side of society. Throughout history, they have egged their men on."

Another parallel with human behaviour might be drawn from the way chimpanzees acted when the experimenters were feeding them. Under natural conditions, they will take fruit from a tree quietly, the higher-ranking animals leaving enough for the others. Then bananas were introduced into this Eden. They were kept in locked boxes; the animals knew that they could not get them all at once. So at feeding time, the chimpanzees would fight.

A dominant animal might corner the market with fifty bananas in his arms and with no intention of letting anyone else get as much as a peel. Some of the wily youngsters found the screws that opened the locked boxes. They would sit blithely covering them with their feet until the adults went away, then they got into the banana business themselves. After a year of these handouts, the practice was stopped because it led to too much aggression.

One would expect scientists to have a great many reservations about applying lessons learnt from watching chimpanzees to the behaviour of human beings. Surprisingly, they did not. Dr. Washburn stated flatly that man and the chimpanzee are closer biochemically than the dog and the fox or the cat and the lion. From this standpoint, the gorilla and the chimp are as different as man and the chimp.

He cited research in Japan and the United States which shows that, for example, in the sequence of amino acids in hemoglobin, there are 52 differences between man and the horse, two between the chimp and the gorilla—and none between man and the chimpanzee.

Dr. Washburn predicted that within the next five years, science will have produced a "biochemical clock" to date the separation of the major groups of primates (among them monkeys, apes and humans) with an accuracy of about one million years.

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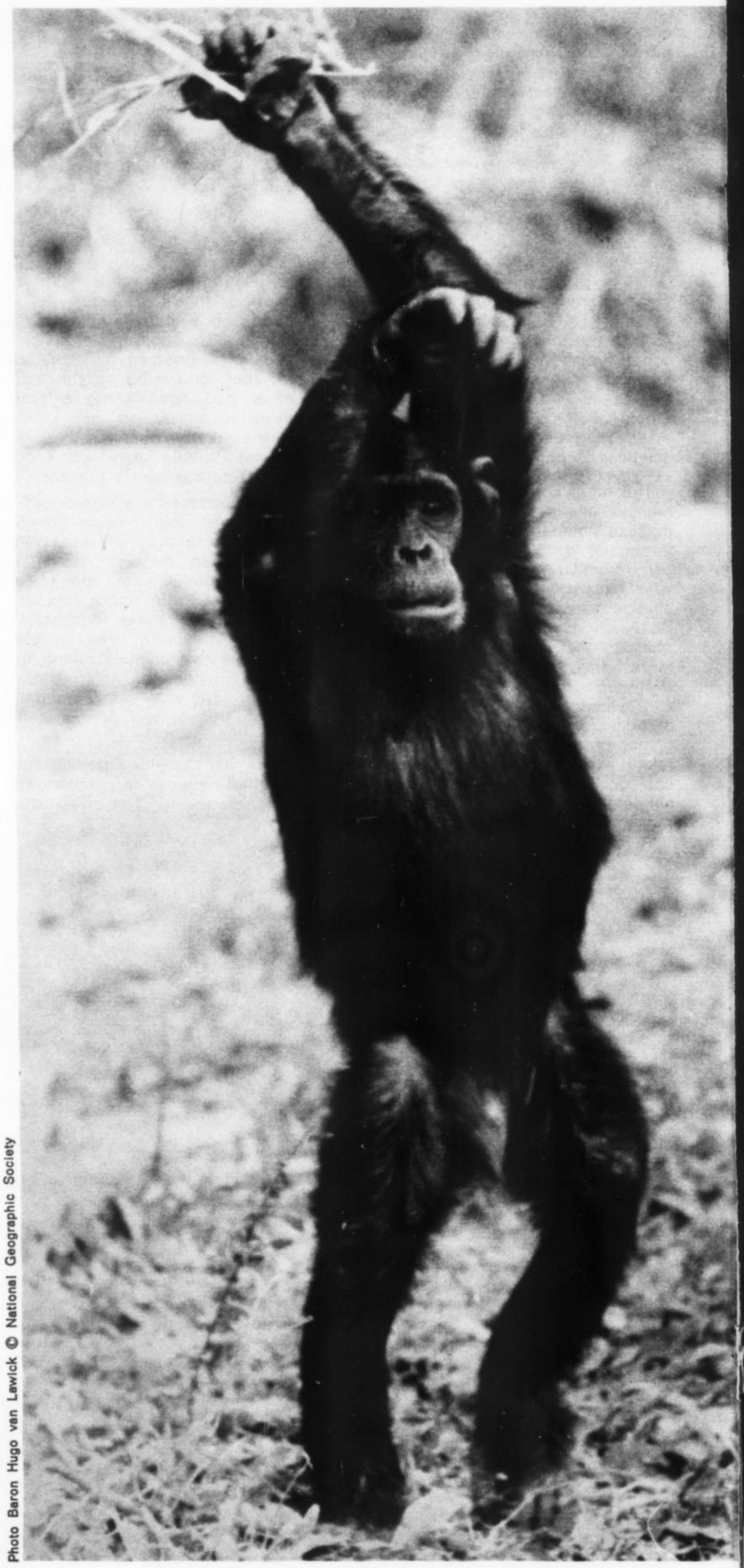


Photo Baron Hugo van Lawick © National Geographic Society

The private life of the wild chimpanzee

A remarkable achievement in scientific research on animal life in the wild is that of Dr. Jane van Lawick-Goodall, a young English woman zoologist. For the past ten years she has lived in the African forest, studying a colony of chimpanzees in Tanzania's Gombe National Park on the eastern shore of Lake Tanganyika. Wild chimpanzees are extremely shy, but Dr. van Lawick-Goodall patiently and doggedly won their confidence until she was able to sit among them and observe details of their lives never recorded before. She studied every aspect of their hierarchy and complex social behaviour and the tremendous variety of calls and gestures which serve them as a language. Her most astonishing discovery was that chimps make and use tools, in particular to extract tasty termites from their mounds. Man has long been considered the only primate with a tool-making talent, which has been a key factor in his evolution. Dr. van Lawick-Goodall's adventurous life among the chimps, which she shared with her husband (who took many of the photos reproduced on these pages) has often obliged her to stay out alone all night to observe chimpanzee sleeping habits and to crouch for hours behind a screen of leaves when photographing an exceptionally wary animal. She says she cannot remember the time when she did not want to go to Africa to study animals. Her sense of vocation has produced a unique and engrossing scientific record of the private life of the wild chimpanzee, some startling aspects of which are presented here.

Photo Baron Hugo van Lawick © National Geographic Society

Left, chimp holding a stone in left hand prepares to hurl it at photographer. Chimpanzees frequently throw objects (well aimed) during aggressive encounters with baboons (and occasionally each other). Chimpanzees learned to accept the presence of the zoologist, Dr. van Lawick-Goodall, among them, and one, David Greybeard, became a firm friend, often popping into camp to visit her.

The Gombe National Park, set aside especially for chimpanzees, spreads across 30 square miles of forested valleys and treeless ridges of Kigoma, Tanzania. Above, a group of chimps in the park, resting in a tree after feeding on the leaf buds. The group comprises fully grown males and females, juveniles and infants.

THE PRIVATE LIFE OF THE CHIMPANZEE
(Continued)

Photos right, Mike the chimp was meek and submissive until the day he picked up an empty kerosene can and found that it made a satisfactorily terrifying noise. He found that, if he did not win friends, he could at least influence other chimpanzees and send them scurrying to the safety of the treetops when he went into his "charging display" equipped with one or more of these clattering cans. Mike has been lording it over his fellow chimps ever since. Above, Faben a young male, relies on his mean and moody look to impress his companions as he charges. lips compressed and shoulders hunched, across a clearing. In captivity chimpanzees become irritable, bad-tempered creatures, but in the wild they rarely fight or harm each other. They achieve their ends by virtuoso pantomime displays of aggressiveness.

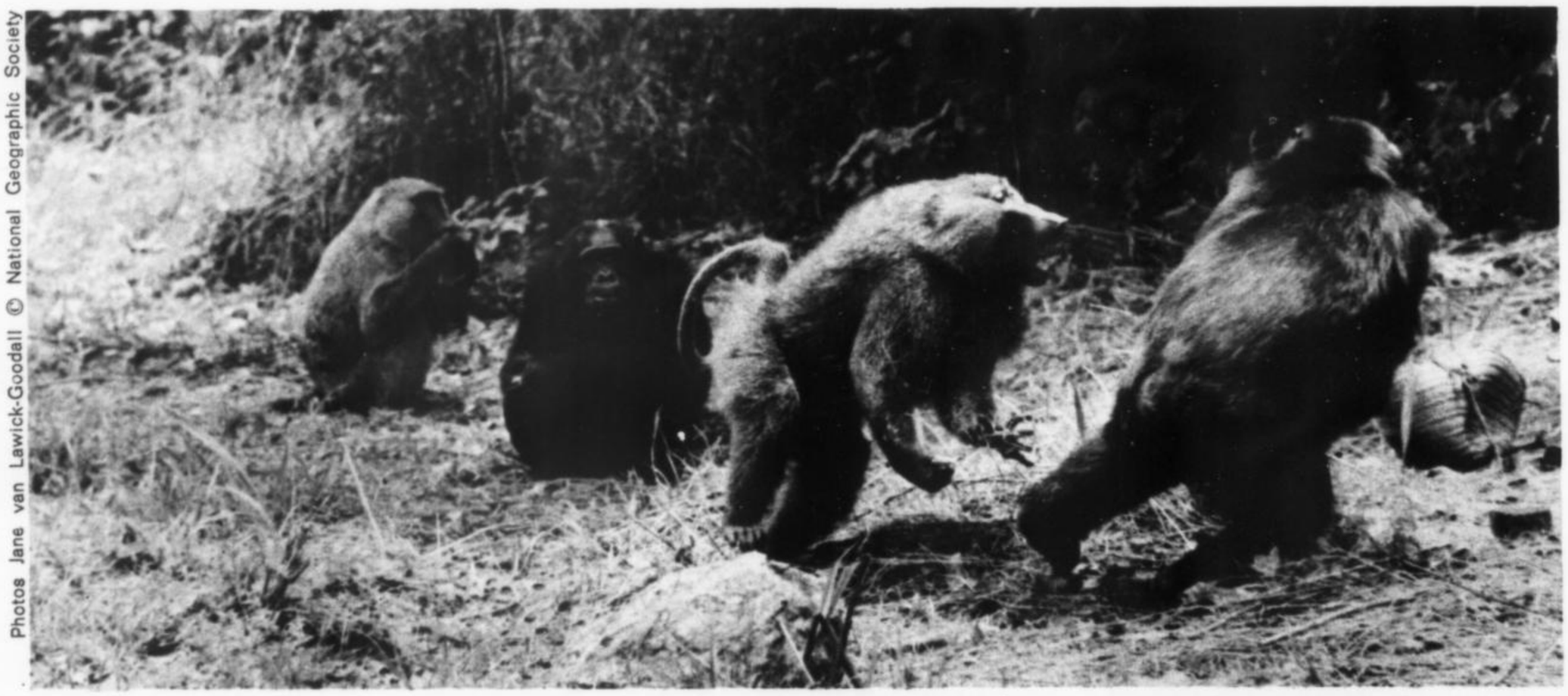
XUM

MIKE THE KEROSENE CAN KING

Photos Baron Hugo van Lawick © National Geographic Society

PANDORA'S BOX —A BASKET OF BANANAS

Photo Baron Hugo van Lawick © National Geographic Society



Photos Jane van Lawick-Goodall © National Geographic Society

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Photo Jane van Lawick-Goodal © National Geographic Society

During most of the year chimpanzees move about in groups of from 3 to 6 animals, but there is no rivalry between groups and they often come together for a few days at a time when a favourite fruit is plentiful. Top left, adolescent male and a mature female with infant giving "pant hoots" in answer to calls from another group. Slightly nervous, the female reaches out a hand to touch her male companion for reassurance. Chimpanzees and baboons live together in comparative peace, but there is occasional rivalry for special delicacies. Left, a basket of bananas placed in a clearing causes dissension. An adult baboon threatens chimpanzee David who screams and runs for help to the more powerful, dominant male Goliath. Together they face the baboon and force him to retire.

Photo Baron Hugo van Lawick © National Geographic Society

At night chimpanzees construct simple sleeping platforms. A suitable fork in a tree is chosen and smaller branches and twigs are bent over to rest across the thicker branches of the fork. An extra handful of leafy twigs is often plucked to form a pillow. Above, mature male William blissfully asleep in his nest. Right, mature male Leakey clamps in his teeth the remains of a baboon caught earlier by a younger chimpanzee. Behind him Mike, the "top chimp", looks on. Contrary to general belief, chimpanzees in the wild are occasionally carnivorous.

THE PRIVATE LIFE OF THE CHIMPANZEE
(Continued)

SIMIAN ETIQUETTE

Photos Baron Hugo van Lawick
© National Geographic Society

When two chimpanzees meet after a separation of hours or days their relative social ranking is immediately established. Top left, Mr Worzle, a mature male raises his arms and hunches his shoulders slightly as Flo, an old female approaches him in a submissive, crouching posture. Left, after mildly threatening a female who forgot her place at feeding time, a mature male reassures her with a friendly chuck under the chin. The female has an infant clinging to her ventrally and two fingers of its hand can just be seen emerging from under the mother's right arm. Below, Fifi, a young female, begs food from brother Figan, putting her hands to his mouth. He will respond by spitting into her hand a well-chewed wad of fruit skin, seeds, etc., which she will in turn chew. Right, two adult females. Flo and Passion greet each other with a friendly embrace. Each of them carries a bunch of bananas.

Photo Jane van Lawick-Goodall © National Geographic Society

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Photo Baron Hugo van Lawick © National Geographic Society

Up against the stone wall

Extreme isolation, like extreme overcrowding, can give rise to either apathy or sharp outbursts of violence in both men and animals. How poignant such neuroses can become is shown in this pathetic photograph of a red-haired orang-outang bashing his head against his cage wall out of deep despair. Scientists believe that such emotional stresses can cause physical damage and even death.

Photo © Life Magazine

Several voices were raised at the meeting to insist on the importance of considering man as an animal so that ethology could be applied to human situations. Then the problem was approached from another angle when Dr. Lionel Tiger, a Canadian anthropologist now at Rutgers University in New Jersey, recalled how men tend to consider wartime enemies as subhuman.

Much lower down than the primates on the tree of evolution, mice also have much to teach us. Dr. Philip Ropartz, of the Psychophysiology Laboratory of the Science Faculty at Strasbourg in France, has done a great deal of work on the role that smell plays in transmitting information to animals and in touching off aggressiveness.

He reminded his listeners that the human observer cannot hope to imagine what animals learn from smell, which is almost their equivalent of language. Experiments have shown that dogs can tell from their sense of smell if their master has been in the city or the country and even if he is in a good or a bad mood.

Working with mice, researchers have found that the males lose their combativity if their sense of smell is eliminated by surgery. Aggressiveness was also braked when mice with normal noses were sprayed with feminine perfume. Like surgery, it masked the mouse's sense of smell, preventing it from distinguishing foes from friends. "Perfume has been used by humans since antiquity," said Dr. Ropartz half-jokingly, "perhaps it also reduces the 'aggressiveness' that the human male feels towards the female."

Dr. Ropartz also remarked that mice become more violent when they live in a state of either extreme isolation or overpopulation. Similar behaviour has been found in monkeys reared in isolation or plunged into crowded zoos. Confined to cages, the animals lower on the social scale are always in contact with their dominators. They constantly eye each other, creating a vicious circular interaction of threats generating aggression that generates more threats. Gang wars have been known to occur in zoos among animals that display no such tendencies in the wild.

Reflecting on these findings, Dr. Ropartz wondered if another vicious circle did not exist in big cities where violent crime is on the rise. One could perhaps say that the violent criminal produced by crowding is isolated in a prison cell, an opposite extreme that possibly renders him even more aggressive.

This speculation brought a reaction from Dr. Miklos Kun, professor of psychology at Eotvos Lorand College in Budapest. Throughout the meeting, Dr. Kun drew on personal experience in making his comments. Here, he

told of two patients of his who had spent more than five years in solitary confinement.

"They were persons of high moral standards who had been rejected by society," he said. "When they were in prison, they told me, they were happiest when they could go to sleep. They had vivid dreams, they saw many images, they relived their past. Following their liberation, they suffered recurrent depressions, but their aggressiveness did not go up."

Dr. Kun also bridled at some of the suggestions that Dr. José Delgado made about the need to plan man biologically in the future. "I am not optimistic about planning a new man" he said. "I am optimistic about planning a new world."

DR. Delgado's ideas were certainly among those that stirred the most comment at the meeting. A Spanish born physiologist, he has taken literally the words that he quoted from the preamble to Unesco's Constitution: "Since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed." One might say that he has already started constructing them in the minds of monkeys.

He first appeared in the public eye when he stepped into a ring with a charging bull which he was able to turn aside not with the flip of a cape but a flick of a switch. The bull carried a two-way radio implanted in its brain so that its behaviour could be changed by an electrical impulse.

Since then, Dr. Delgado has gone much farther. He told his listeners that "in the next five years, we shall see a revolution in the medical treatment of aggressive behaviour as important as the appearance of antibiotics in the treatment of infectious diseases." The basis for this prediction, he said, lies in research now being conducted on the "intracerebral mechanisms" that govern such behaviour. "We are no longer outsiders looking on, but insiders investigating what goes on in the depth of the brain when a subject feels aggression or rage."

Starting with animals, Dr. Delgado has been particularly concerned with learning what happens inside their brains when they are free in a near-normal social environment and not in a laboratory situation. He told of two techniques.

The first involves implanting very fine tubing inside the brain which is connected to two sacs under the skin. This enables the scientist to inject drugs into the brain that can serve to block the functions of specific parts, a substitute for surgery in treating certain disorders. Labelled substances can also be introduced into the animal's brain and later analyzed to see if "neurochemical structures differ in different behaviour"—which they do.

The second technique is the "stimoceiver"—a two-way radio which is both a "stimulator" and a "receiver". As many as 3,000 different points in the brain of a monkey have been studied by this method.

In its latest form, the "stimoceiver" has been hooked up to a computer to monitor the behaviour of a colony of chimpanzees on an artificial island at Holloman, New Mexico, in the western United States. Their spontaneous activities send signals that are analyzed and recognized by the computer. In the event of a special form of behaviour—aggression, for instance—the computer triggers stimulation to a different part of the brain to eliminate such behaviour. "In this way the brain learns to modify its own activity," Dr. Delgado explained.

He went on to report on his work with six human patients who have had "stimoceivers" planted in their heads. "If a person is behaving anti-socially," he explained, "there are chemical and electrical mechanisms that we can identify and modify."

Needless to say, this work brought some strong comments from his colleagues at the Paris meeting. Dr. Hector M. Capello, head of the department of social psychology at the National University of Mexico, put their fears into focus when he remarked: "It is plausible to control behaviour by these methods, but it is not plausible that these methods can determine what sort of behaviour should be controlled."

Dr. Delgado was not at all taken aback for he must be well accustomed by now to such criticism that, in some cases, can go so far as to hint that he is creating an Orwellian world of "1984". He replied, first, that he had begun to introduce electrodes into brains because of his own reluctance to use lobotomy [severing nerve fibres in the brain], a technique that produces irreversible change, in treating such disorders as Parkinson's disease, epilepsy or intractable pain.

"Is it dangerous to go on with this work before we have much more thorough knowledge?" Dr. Delgado asked, then answered: "Our patients cannot wait. If a man is in intractable pain, one cannot wait ten years before treating him."

Then he reassured Dr. Capello and some of his other critics. "This technique cannot be used to control human behaviour. It is, first, a medical tool for research and therapy and, secondly, a new approach to learning what man really is inside his brain. I certainly do not claim that we are going to start implanting electrodes into the brains of our children and politicians to change their behaviour."

Dr. Delgado showed colour slides of his experiments that demonstrated how the stimoceiver can make a monkey walk, then run. One set of slides brought the answer to the dream of the timid soul who quakes before crossing the threshold of his boss's office.

A timid monkey had been placed in the same cage with a dominant animal equipped with a stimoceiver. In the cage, too, was a lever that sent a signal into the boss's brain, changing him from a lion to lamb. The timid soul soon learned how to work the lever and the results were startling. One slide showed the "top dog" (that is, the top monkey) making the "under dog" miserable, the next showed the boss cowering after the magic button had been pressed.

Dr. Delgado is convinced that the brain learns aggressiveness. "Is there a killing instinct in man? No, man is totally shaped by culture. The difference between man and the animals is that his brain is so immature at birth that, in the absence of sensory input, his mind cannot work. His genes are only modulators, the brain's source of information is cultural, not genetic."

From this premise, he went on to advocate education of the child aimed at "mentalization" rather than mechanization of society. "We are now at a crucial moment in civilization. Nature once controlled man, man now controls nature, soon we can establish intelligent control of man. We can correct the imbalance between the material powers of man and his mental direction —for we are now as wild as we were many centuries ago."

THE source of aggressiveness was taken up from still another angle by Dr. David Hamburg, the chairman of the meeting. He reported on research that has already linked the presence of abnormally high amounts of testosterone, the male sex hormone, in mothers to aggressiveness in children.

While there is not enough knowledge at present to enable these findings to be applied practically, Dr. Hamburg foresaw that "decades from now", the physician and his patient might choose therapeutic abortion to prevent the birth of an "extremely aggressive individual", a potential Hitler or Genghis Khan.

Presence of the male sex hormone at a somewhat lower level could lead in this same distant future to treatment of the pregnant mother with substances to counteract the effects of male hormones. Such substances could be administered just as fluoride is added to drinking water to prevent dental caries.

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UNDERSTANDING MAN'S AGGRESSIVENESS *(Continued)*

Dr. Hamburg remarked that political problems no doubt would arise as they have with fluoridation. Nations would not wish to lose the qualities of self-assertion, vigour and determination that many feel are linked to an aggressive personality. Therefore, Dr. Hamburg said, biochemical treatment of high-risk aggressiveness "would probably require a system of international agreements—an idea that is almost science fiction today."

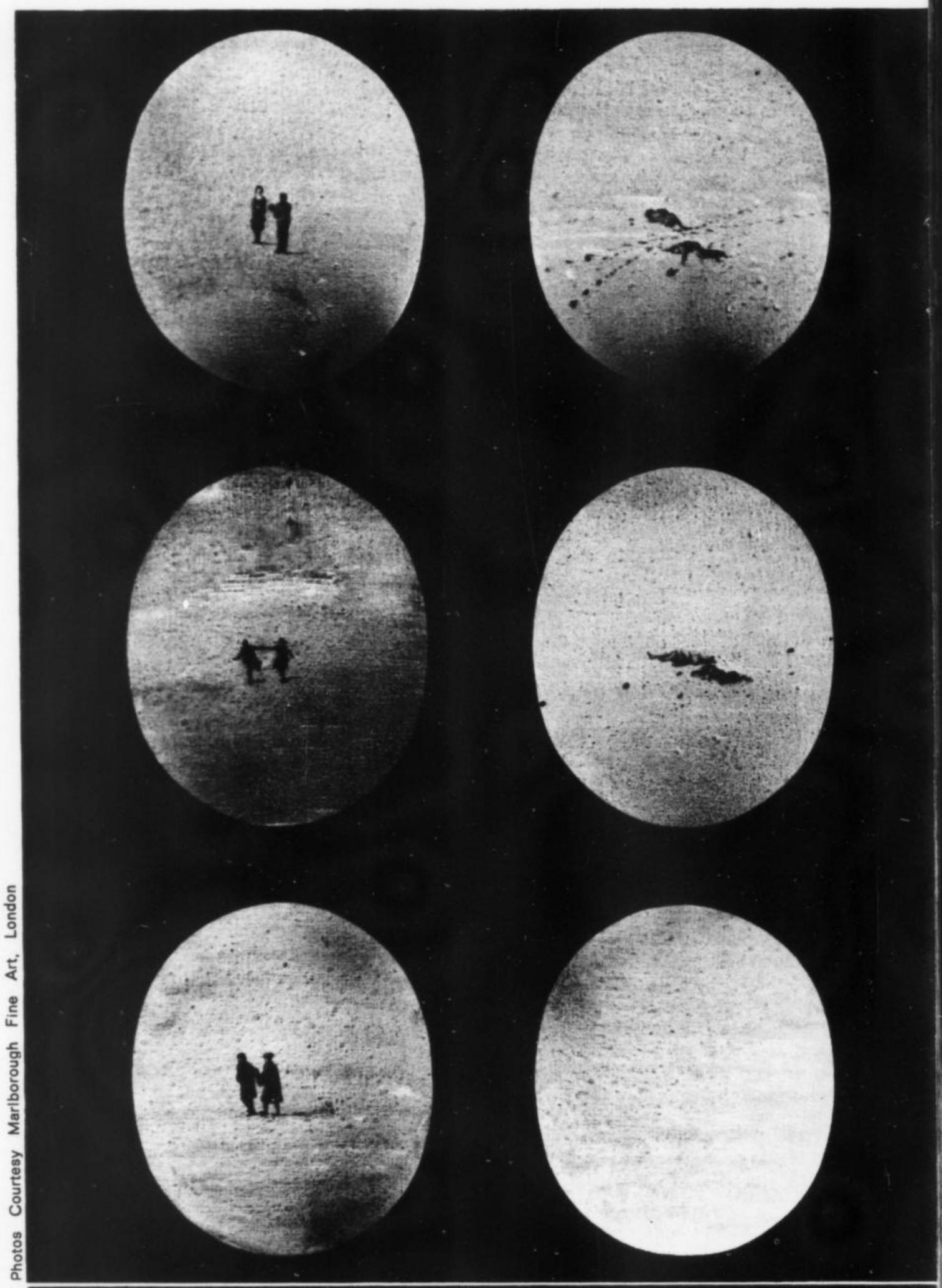
Here it might be appropriate to mention a theory referred to at the meeting by Dr. Lionel Tiger. He is convinced that "corporate aggressiveness" such as war is a male function. Discounting tales of the Amazons, Dr. Tiger said he has been unable to find a well-documented case of a culture where women were the warriors or the hunters of large animals. War is for men only, it's not a universally human activity. As for female aggressiveness, he maintained that it is not "corporate".

Dr. Capello observed that the meekness of women in Latin American cultures may not lie in their hormones as much as in the fact that they have been trained "to express a reduced motor response".

Dr. Hamburg explained that laboratory work with animals shows that an abnormally high amount of male sex hormone seems to have the greatest effect at an early age. It makes it easier for the subject to "learn" aggression and to learn it for good even when its hormonal balance goes back to normal.

THIS brought the meeting to a theme that it seldom left: education. Experiments cited by Dr. Hamburg with monkeys showed that very young animals exposed to threatening images for only a short time will react to them six months later. Immediately, a correlation with television comes to mind. It is estimated that, in a country such as the United States, children spend as much time in front of the TV set as they do in school. In fact, before they start going to classes at the age of six, television is the biggest factor in their education.

As a school of violence, it can be very effective. Surveys in the United States of programmes offered by the three major networks have shown, Dr. Hamburg said, that a murder occurs once an hour on the screen, and once every half an hour during peak viewing time, the early evening hours. Every eight minutes, there is a violent incident to be watched. To make matters worse, Dr. Hamburg went on, this violence is "sanitized". There is no blood, there is no unpleasantness. It is shown as a neat way to solve problems.



Photos Courtesy Marlborough Fine Art, London

VISIONS OF OUR TIME

The arresting works of Spanish painter Juan Genoves are an indictment of violence in all its forms, from oppression and brutality to war, murder and the senseless destruction of living things at the hand of man. His variations on these themes denounce man's inhumanity to man and his increasing capacity for self-destruction. In some paintings, Genoves shows men hunted down by war machines (top right, framed in the sights of a weapon, terrified crowds seek vainly to escape); in others (right) he depicts them fleeing from some nameless threat. In the chilling six-scene painting above, two tiny figures run helplessly across a featureless desert but are finally cut down. Soon the footprints of the assassins and then the bodies of the victims are effaced. Murder, without leaving a trace, has been committed. The grey and black colours of Genoves' paintings and their slightly blurred effect recall scenes from newspaper and newsreel photographs and on-the-scene television coverage. But with their anonymous figures and no identification of time or place the paintings speak in the present tense. Their message is that helpless, faceless victims, individual figures or scurrying masses (see also front cover) are being harassed and hounded down here and now. Works by Juan Genoves, born in Valencia, Spain, 40 years ago, are displayed in galleries of North and South America, Africa and Europe. An exhibition of his works in London was the occasion for the shooting of a film, "A Test of Violence", in which live action and special effects gave another dimension to Genoves' paintings on the screen.

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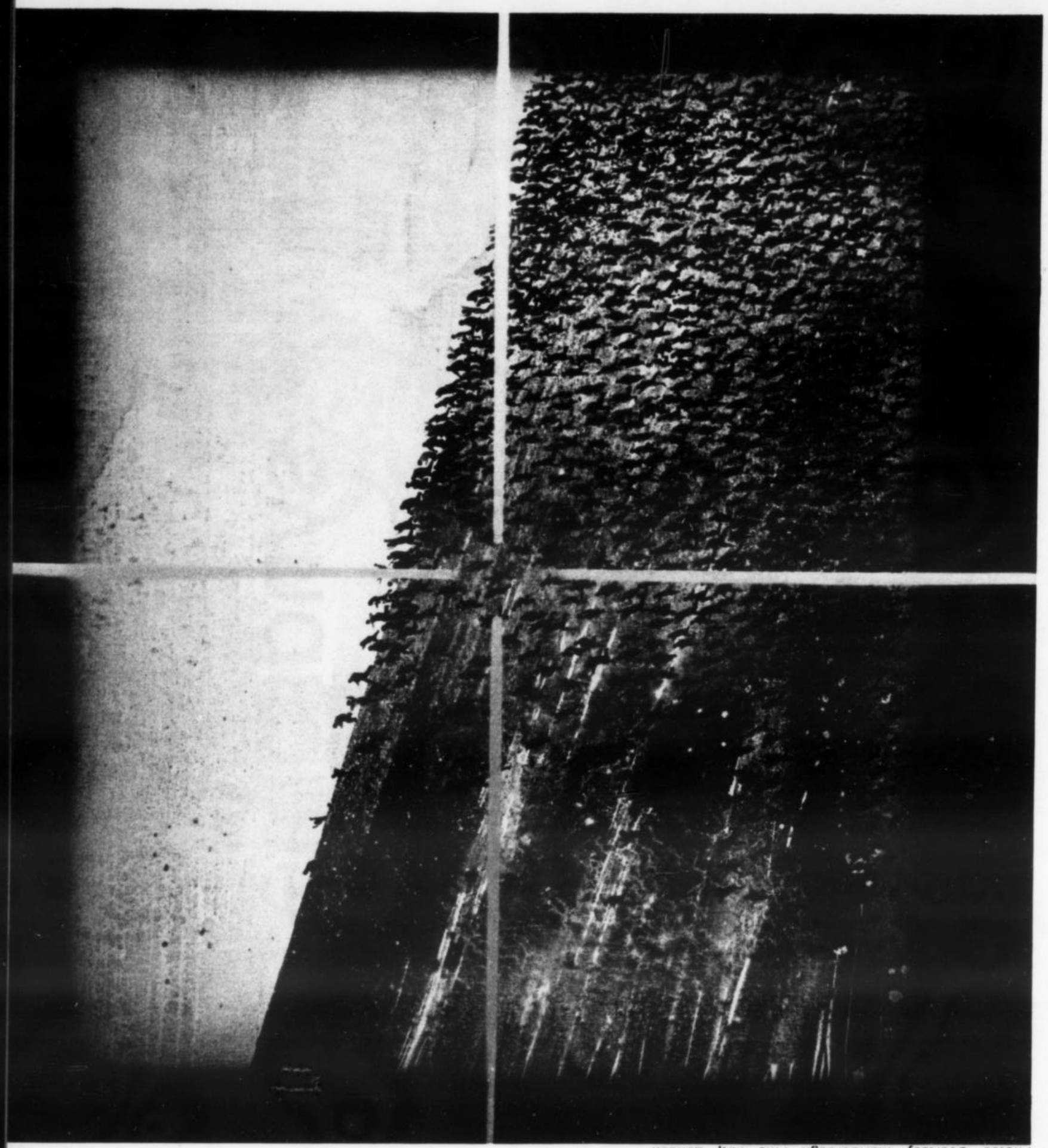

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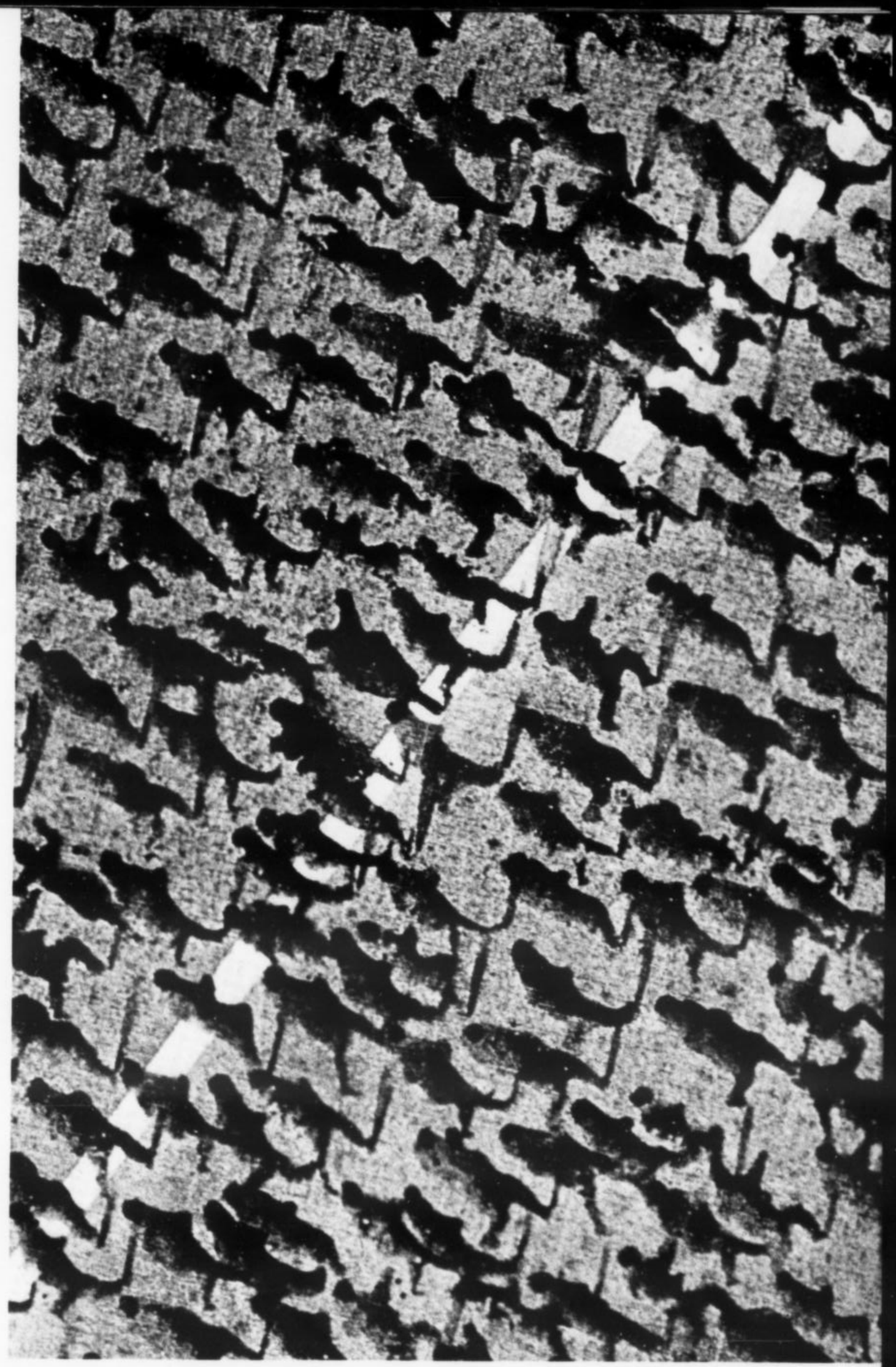

3. The big city syndrome

WHAT can education do in the face of the barrage of violence that comes via the TV screen? In Dr. Sherwood Washburn's opinion, it is not doing very much. An outspoken man who has had ample opportunity to study violent behaviour by young males outside the windows of his university office at Berkeley, California, Dr. Washburn declared: "Animal behaviour studies show that early environment is tremendously important. Yet our education system is the worst possible system. It delays the start of education much too long. Then it uses discipline rather than play. It would be hard to devise a worse system for educating human beings. It is at the root of many of our problems of aggressiveness."

He gave equally short shrift to the system of higher education that has stirred such widespread student protest in the United States and elsewhere. "The trouble with universities is that they are housing people who don't want to be there," he said.

"Students come to universities because they want a certificate for a job, they want to find a mate or because their parents are compensating for having treated them badly in childhood. So students rebel in universities because, perhaps, they have no choice but to go there."

This tendency seemed to have a parallel in a quite different society, that of Baghdad. Crimes of violence among students there, Dr. Kemal noted, are highest in the case of students whose parents live in the city itself. His explanation was that students who come from outside the city have more purpose and less luxury in their lives.

Soon, it became obvious at the meeting that there were similarities between two apparently unlinked examples of modern aggressive behaviour: student protests and violent crime in the cities. Both might be correlated to some extent with overpopulation. The big university of today, the so-called multiversity, is a city. Dr. Hamburg observed that the earliest known city was Ur in the Near East. Archaelogists have estimated its population at 40,000—just half the enrolment of the University of California.

The mention of urban violence opened a Pandora's box that the meeting never really closed because no one yet knows how. There was even disagreement over whether cities are more violent than they used to be. Dr. Tiger said they aren't and claimed that high crime rates now exist simply because many incidents ignored in the past are reported today, particularly when they involve more prosperous citizens.

Dr. John Gunn, a British forensic psychiatrist who was at the meeting as an observer, warned of the danger of using crude crime statistics to reach precise scientific conclusions. He also added a question mark to findings by ethologists that animals are most aggressive of all to strangers. Humans, he reminded the experts, are even more aggressive to their kin and there is nothing that policemen dread more than being called to intervene in a violent family quarrel.

In the developing world, the problem takes on a different cast. Violent crime in Baghdad, Dr. Kemal pointed out, is highest among new migrants from rural areas who make up half the city's population of two million. Among the newcomers, the crime rate is lowest for those who are living in neighbourhoods with other city dwellers rather than in settlements composed mainly of migrants.

The same story was told by Dr. Shib K. Mitra of the psychology department of the University College of Science in Calcutta. Crime is up in his city, too, and he attributed this to the anonymity of its crowds. "In a big city, a person from a village loses his niche. These are the people that become lost souls."

One reason why they do was advanced by Dr. D. B. Lubis of the psychiatry department of the Faculty of Medicine at the University of Indonesia. He remarked that, in a country like his, the big city is a centre of Western culture. When the farmer pulls up stakes and moves to Jakarta, he is not only going from the country to the city but to an entirely new culture as well.

This does not only happen to country people. Cities today are changing so fast that even their native sons are left bewildered and disoriented. Dr. Delgado told of the urban renewal programme that has been carried out in New Haven, the home of Yale University. "The city is now beautiful and modern but I feel as if my personal identity is lost. I don't see colourful gypsies in the street any more, I don't see the old Negro church with its piano banging. My whole history has been stolen."

OF course, there are cities and cities. Dr. Kun stuck to his guns to defend his beloved Budapest where, he said, the rate of violent crime is much lower than in remote rural villages of Hungary. Dr. Hamburg then suggested that some research on the optimum size of cities could be very useful. He observed that we are as ill-adapted to the urban as we are to the industrial civilization. No society was urbanized before 1800 when only 2.2 per cent of Europe's population was living in cities. Even as recently as 1900, only one country, Great Britain, could have been called urbanized. "We have gone from a situation

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VIOLENCE AND THE MASS MEDIA

Nobody regularly reading a newspaper or watching television in Europe or North America needs to remind himself of the place of violence in modern society—the media do that for him daily. Equally, nobody working in the media can be unaware of a growing suspicion that the media might be in part responsible for the violence they portray—there have been enough commissions of enquiry and letters from the public to make that clear. But suspicion is not so far based on any generally applicable scientific findings and there is deadlock between those who accuse the media of creating a demand through their supply of violence and those who cry "censorship" and warn that the media must not be made a scapegoat for conditions society is unable or unwilling to do anything about. As this issue of the "Unesco Courier" went to press, Unesco was attempting to review the present state of knowledge on this problem and to seek practical proposals for action through a symposium on "The Impact of Violence in the Mass Media" at its Paris headquarters. Participants from 20 countries will tackle such fundamental questions as the definition of violence, whether it can be said to be increasing and whether attitudes have changed towards it, as well as exploring the difference in impact between the message on the screen, the printed page and in the comic strip, the varying effects of violence in fiction and news and the responsibility of the mass media.

of no one in cities to the present trend of everyone in cities."

Some work has already been done to try to determine if big cities really make humans behave inhumanly. Dr. Philip Zimbardo, a Stanford University researcher, bought two cars. He left each out in the street for nearly three days with its hood open and its licence plates removed, one in front of Stanford at Palo Alto, California, and the other next to New York University in lower Manhattan.

At Palo Alto, a town of about 50,000, nothing happened to the car. When a rainstorm broke, some kind passers-by pushed it under cover. In New York, Dr. Zimbardo's watchers found, the car was in the street no more than seven minutes before it was damaged. By the end of the experiment, it was nothing but a stripped and battered hulk. Most of the damage had been done in daylight and by well-dressed members of the white middle class.

The explanation can be found in the anonymity of the big city. The New Yorkers who damaged the car felt that they did not know the owner and that they would never see any of the other passers-by again.

In another experiment mentioned by Dr. Hamburg, four students rang peoples' doorbells to ask if they could use the phone. They conducted their test in New York and in a town of 60,000 nearby. Their chances of entering an apartment were five times higher in the small town. In New York 75 per cent of the people whose bells they rang shouted through closed doors or peered through peepholes. In the small town, 75 per cent opened their doors.

"We must remember that cities do crowd strangers," Dr. Hamburg remarked. "Every day, people come into contact with strangers whom they will never see again—and with whom they compete for a short supply of everything from parking spaces to sexual partners."

How and why these findings by ethologists, anthropologists, psychologists—all representatives of the natural sciences—can be applied to the actual world was the concern of Dr. Nicolas Kovalsky from the U.S.S.R., deputy-director of the Institute of the International Labour Movement, in Moscow. Dr. Kovalsky wanted more emphasis on the social factors behind aggressiveness which he divided into three categories, respectively involving individuals, national societies and the international world. He warned, too, about the dangers of being too biological in one's approach to the problem.

4. From club to megabomb

IT was Dr. Ole Holsti, professor of political science at the University of British Columbia in Vancouver, who provided a hinge, between the social and the natural sciences. He reported on the work he has done on subjects under stress, not monkeys or mice but human beings, including statesmen in historical situations. The son of a Finnish official of the League of Nations, Holsti was born in Geneva and now works in Canada—almost a one-man international relations institute.

He is interested in finding out what happens to people under stress when they have to make decisions that could lead to the ultimate human aggressive act: war. He first stated that there is a biological basis for what statesmen do in these situations. Human beings do not have an infinite capacity for processing information. They can only juggle so many things in their minds at the same time—about seven, give or take two either way. This means they make mistakes under pressure.

Dr. Holsti pointed out that a physician is considered extraordinary if he can cure 80 or 90 per cent of his patients, but such a record is not nearly good enough for politicians trying to avoid war in the age of the nuclear missile. According to current findings, war is not a pathological situation created by a Hitler. Irrational decisions can also be made by normal individuals in times of stress.

Some stress is a good thing and, at moderate levels, it can improve performance. Dr. Holsti cited a hypothetical emergency: a city is likely to be hit by a major flood and its citizens must fill and stack sandbags to protect it. This is a simple task and, under stress, people can actually do physical labour much longer without tiring.

But different skills are needed to make decisions during a crisis. Experiments show that the level of these skills drops in such a situation. Under stress, subjects tend to see situations as black and white, never distinguishing greys. They display "deterioration of verbal performance, increased rate of error, diminished tolerance for ambiguity, loss of abstract ability and disorientation of visual-motor co-ordination." As Dr. Holsti read this list, some of his listeners wondered whether people in such a condition should be allowed to drive a car, let alone steer a ship of state.

The worst stress of all is time. The

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statesman is under pressure to be the first to mobilize, or not to be beaten to the draw when the other fellow has a nuclear missile in his holster. It makes no difference whether the danger is real or not. "If he believes that something is true, then this is more important than if it is true."

In the summer of 1914 when local crises led to the First World War, statesmen felt they had to be the first to mobilize. Between French and German mobilization, there was only a difference of five minutes. No time was available to make alternative choices and, according to Dr. Holsti, great stress even distorts one's ability to perceive the passing of time.

It also leads the individual to concentrate on the immediate rather than the distant future. "It's the problem of the drowning man—you have to get him to breathe before you worry about whether he will catch pneumonia," Dr. Holsti said, but then added: "Unfortunately, short-term advantages may be long-term disadvantages."

IN times of crisis, statesmen tend to filter out information that does not agree with their own opinions, to consult only a limited number of advisers, or none at all. Going back to World War I, Dr. Holsti remarked that the Kaiser wanted to believe that Britain would stay out. In the margin of a report from his ambassador to London warning him not to count on British neutrality, he wrote: "This old fool's information should not be believed." He thought much more of his ambassador to Russia who was telling him what he wanted to hear: the Czar would never go to war over Serbia.

Dr. Holsti then moved to the eve of the Second World War. Robert Vansittart, British Permanent Under-secretary for Foreign Affairs, kept insisting that the Soviet Army was not weaker than the Polish Army and that Hitler was not likely to be satisfied by a piece of Czechoslovakia. Convinced that no one was reading his memos, he purposely mixed their page order—and received them back still in the same order, initialled as having been read.

As usual, Dr. Kun spoke with the voice of his own past. He related how he had served in the Hungarian resistance movement during World War II. "Stress was high near the end of the war. The streets of Budapest were full of corpses, we in the underground had lost contact with each other. I was responsible for the lives of 400 Jewish children who had to be kept hidden and fed. We found that our performance was highest under stress. Today, I just cannot imagine how I performed my duties then."

Dr. Hamburg commented that studies do show that some people are highly creative, under stress, but that this is not true for all. Dr. Holsti agreed with him on the basis of the lessons gleaned from recent world history. They raise what he called the biggest question of all: what can be done? The answer, in his opinion, is to buy time.

Dr. Holsti compared the summer of 1914, which saw "a great increase of communications, but not with one's enemies", to the Cuban missile crisis of 1962. He pointed out that President Kennedy took great pains to get alternative viewpoints before taking decisions, even absenting himself from discussions because he knew that his presence, as the president, might inhibit them.

When it was decided to pull back American vessels so as to give Soviet ships more time, the message was sent not in code, but in clear so that it could be intercepted. An intercepted message, Dr. Holsti said, was deemed to be more credible than a public statement. "I certainly hope that the world will not undergo another Cuban missile crisis, but it did prove that how one behaves under stress can make a difference in such a situation."

DR. Holsti did not go along with the widely-held belief that individuals unable to withstand stress fall by the wayside in politics, a process that President Truman summed up in his famous remark: "If you can't stand the heat, get out of the kitchen." Today, said Dr. Holsti, "there are new paths to the attainment of political power. We cannot rely, if we ever could, on the normal pattern of political advancement—to weed out people unable to cope with pressure."

Nor can we go on relying on war as a force for human evolution. This reminder came from Dr. Robert Bigelow of the zoology department of the University of Canterbury, at Christchurch, New Zealand. Dr. Bigelow is the author of *The Dawn Warriors*, a book in which he sets forth his theory that warfare played a fundamental part in the development of man.

During prehistoric times, early human societies competed with each other for space. Individuals within groups had to co-operate for defence; they needed signs and symbols to communicate. "The most co-operative groups took over new terrain and pushed out the least successful groups by killing them," said Dr. Bigelow. "Within one or two million years, the size of the human brain trebled and so did man's capacity to communicate."

"The extent of human co-operation rose enormously. I think that we now have only one or two steps further to go to achieve global co-operation. We cannot eliminate competition but we have good cause to hope we can render old-fashioned warfare obsolete, even though it was warfare that forced us to co-operate. If we don't exterminate the species with nuclear weapons, global co-operation is inevitable, although we may have a dark age of two or three centuries."

A time scale for the changes in brain structure that Dr. Bigelow cited was supplied once more by Dr. Washburn. He pointed out that early man's brain capacity remained unchanged for two or three million years. During this period, there was not much evolution, either, in the stone tools that he produced.

"Then, 700,000 years ago, a very different kind of tool appeared. Any fool can make the early tools but experiments have shown that graduate students cannot succeed in reproducing the later ones even after ten weeks of laboratory work. Man's brain had become twice as large. He had a new order of skills, he knew fire, he was hunting large animals. There was one species of man in the Old World from China to England.

"It would seem that, 40,000 years ago, the whole game changed again. We see different tools and it is at this time that the roots of our present-day languages may have appeared. If you put Java man into our school system, he would not get anywhere, but late Neanderthal man would go right through college." And, one could not help but think, without anyone even noticing his caveman manners or hair style.

We seem to be right back where we started when the curtain went up on history. Not quite, however. Humans are as aggressive as ever, but we now wield not clubs but megatons. We just cannot go on living the same way if we are to go on living at all. To quote Dr. Washburn once more: "Man must adapt—the species that did not adapt are extinct."

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5. Man's real missing link

Photo © Reportages G. Bern

AT the end of the meeting on human aggressiveness, Dr. David Hamburg weighed up man's chances for adapting, and summed up what he and his colleagues had concluded about the basis for both individual and group aggressiveness and the likelihood of doing something about it.

His opening premise was optimistic: "Aggressive customs, though built on a biological base, can be modified, but not easily. If aggressiveness is then reduced, other types of constructive activity become possible." This is a task for education, which, said Dr. Hamburg, "must teach not only that violence is bad but that there are other ways of coping with problems in an emotionally-charged situation."

He said that the discussions had brought out four major categories of situations leading to individual aggressiveness: a clear and present danger to survival; frustration of self-esteem; a threat to close personal relationships; and a threat to one's sense of belonging to a larger group.

While Dr. Hamburg had been one of the meeting's most forthright critics of the effects of bloodshed and violence in TV shows on young minds, he saw television as an extremely hopeful tool. He recalled, in this respect, the solidarity he sensed in a Stockholm hotel lobby when about 100 persons from all over the world were watching the return of the Apollo 13 flight.

"The potential unifying effect of television was never so obvious to me . . . but perhaps one need not have astronauts near death to use television in this way."

As an immediate step, he recommended that the mass media show the seamy side of aggressiveness. "Violence must be in bad taste on television if it is to have the effect of reducing aggressiveness."

Then he looked at the positive side of the problem. The scientists at the meeting, like so many of their predecessors, agreed that a substitute must be found for aggressiveness. Dr. Hamburg summed up their feeling: "If hunting and warlike activities are no longer appropriate to develop the self-esteem of young males, then there must be something else." He suggested that children should be given more of a chance to see what their fathers do for a living—so that their only "male models" will no longer be the hard-shooting cowboys and criminals on the screen.

Following his remarks, Dr. Makaminan Makagiansar, an Indonesian social scientist who is now a Unesco staff member in Paris, made it clear that the problem goes beyond the individual. "We must change institutions that create situations where one must be aggressive to survive," he said, and drew an example from his own recent experience.

Coming from Indonesia, where cradle-to-the-grave security is provided by the family and language is full of buffers to prevent feelings from being rubbed raw, he landed in Paris with a car. "I thought I could never drive in Paris, but I did. I just became as aggressive as some Paris drivers."

Dr. Holsti, the political scientist, transposed this view to the world scene. "In the present international system, we play the game under rules like those that apply to driving in Paris. One need not posit that others are aggressive. If we do, this can make

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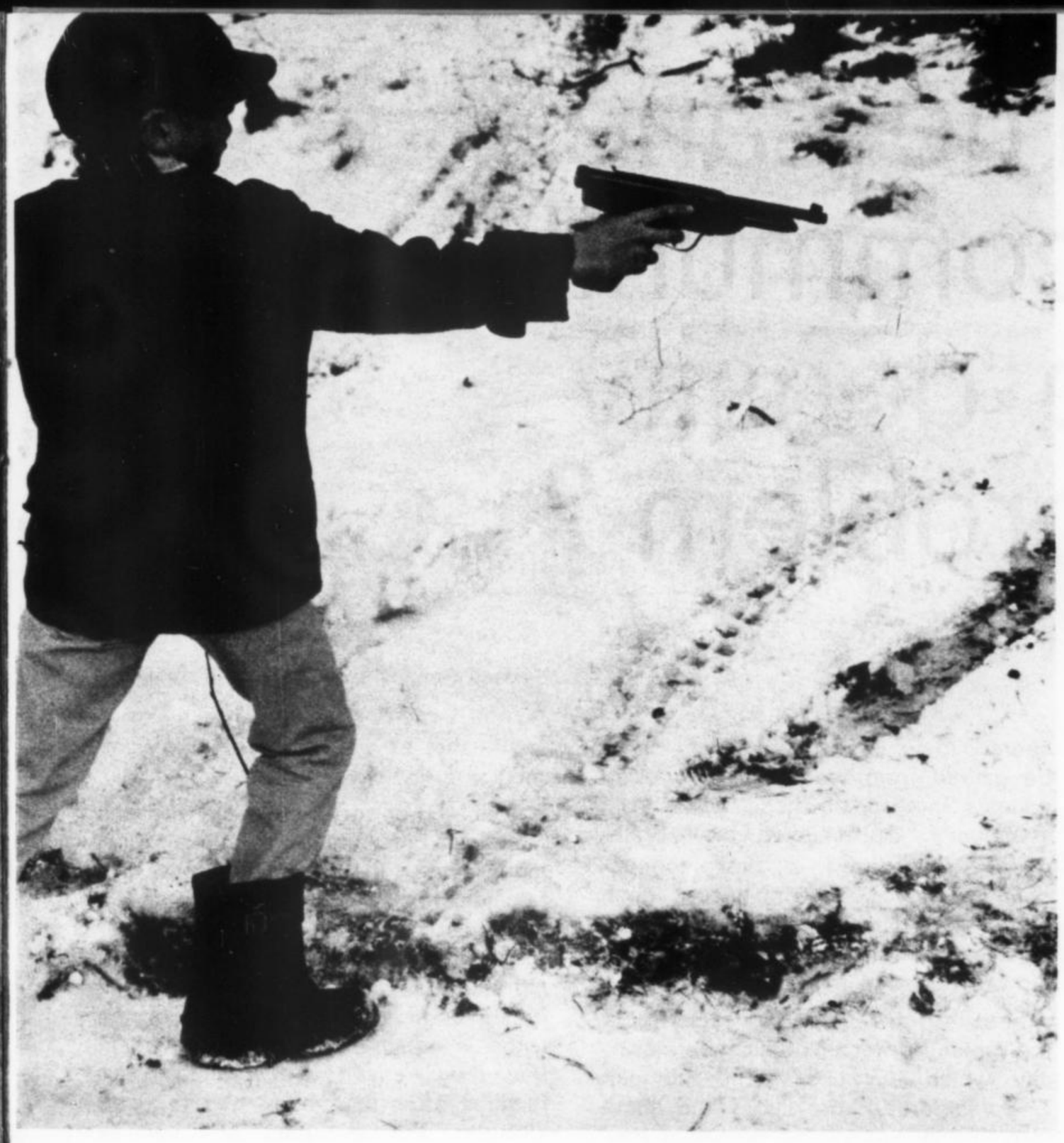

To untold millions of youngsters, the "tough guy"..law breaker or fast-drawing cowboy..has become a staple "hero". Hostility and hate, violence and brutality are built-in ingredients of many TV films and so-called "comic" books. Many psychologists now believe that other occupations and professions can also be made very attractive, so that the trigger-happy cowboys, criminals and under-cover agents no longer constitute a major source of glamour for children and young people.

a system as dangerous as the Paris traffic system sometimes seems."

That is the very root of group aggressiveness as Dr. Hamburg saw it in his conclusions. He called for research on "the virtuosity of the human mind to provide justification to harm out-group members." These justifications are usually based on three reasons: the damage that "they" might do to "us"; the damage that "they" might do to themselves if they were not prevented; and the conviction that the "others" are not really human.

What is unusual about these beliefs, said Dr. Hamburg, is that they can be produced by a great variety of political and social systems. Progress will be achieved only when it is generally recognized that *all* societies are dangerous, not just the other fellow's. "Man is a potentially violent animal organized into potentially violent societies."

We will have much more of a chance of survival, in Dr. Hamburg's opinion, if we can come to think of ourselves as a single species, if we can identify ourselves with a world species while respecting diversity of cultures. Perhaps the family can serve as a model for a human family but, as participants in the meeting had already remarked, it is difficult to expand from the awareness of a small number of people to a world community.

Dr. Hamburg and others felt the need for a "superordinate goal" to weld the world together. "A threat to the species could be effective," he remarked, "but we have lived in the shadow of extinction for twenty years while our statesmen still talk in 19th century terms. Perhaps we need 100 years to avert the danger of nuclear war . . . but will we get the remaining eighty?"

He saw more immediate hope in what we called "overlapping group memberships" that can link people together through multiple loyalties. Business, industry and international organizations can provide them. A particularly good example, he felt, is that of the graduate students in universities who can serve as a bridge between the students and the faculty in times of crisis. Such reconciliation services could be developed on a well-organized basis for many more situations where violence is likely to break out.

As the meeting drew to an end, other members came up with their ideas to cut tensions and violence, whether national or international. The suggestions flew thick and fast: "Peace corps" types of activities for youth; revision of history textbooks so that they no longer teach violence; education in international understanding in schools; a Unesco survey of the world's educational systems to see why they make people think they belong to a superior group . . .

Old Unesco hands at the meeting almost thought they were watching a ghost. Nearly twenty-five years ago, these were the ideas in the air when Unesco came into being in a world so shaken by the ravages of war that people were convinced nothing of the sort could ever happen again. Today, *that* illusion has gone. History is repeating itself, the unthinkable is once more in sight and in mind. This meeting showed that man has a chance to survive if he can recognize why he behaves the way he does. But he will not have very many more chances if he does not. ■

The sane community—a density problem?

by Paul Leyhausen

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MAN is supposed to be the all-round-adaptable animal. Yet in modern times an ever-increasing number of medical, psychological and social workers is concerned with the care, and if possible the cure, of an even more rapidly growing number of socially ill-adapted, maladjusted individuals. According to common belief, Man is also an essentially social animal. However, beliefs vary widely as to how Man as a social being should behave. Thus it is hard to define conclusively the individual's place in the community.

In an attempt to find out something which might also throw light on the fabric of human societies, no animal species living in some sort of social organization has been spared comparison, from ape and wolf down to bee and ant. On such findings—the value of which cannot be doubted—a variety of theories has been based.

At present the prevailing opinion is that there is always some kind of co-operation between or combination of nature and nurture as the two possible sources of human social behaviour, with the emphasis heavily on nurture, especially learning. However, the argument continues, and as more detailed data and facts are amassed, we seem to get further from a comprehensive understanding of the patterns and forces underlying the social life and development of our own species.

Under the circumstances, it may seem odd to expect any new clue to be gained from the study of solitary animals instead of those living in a community. Certainly, when Dr. Rosemarie Wolff and I, at first independently and not knowing about each other, started to investigate the behaviour of free-ranging domestic cats, we did not envisage this surprising result.

First let me recall some facts about the ranking order or dominance hierarchy which the Danish psychologist T. Schjelderup-Ebbe discovered some forty years ago in the domestic fowl and which, with very slight variation only, seem to apply to almost all vertebrates which live in social groups.

Schjelderup-Ebbe found that the hens of a barnyard do not by any means have equal rights, but establish among themselves a "peck-order" in which each individual is allocated a definite place on the social ladder which it is normally unable to alter. Usually a subordinate does not even try to fight a superior animal even if grossly provoked. When it does, it is almost invariably quickly subdued. Very rarely, and only after prolonged and bitter fighting, does an inferior animal succeed in improving its social position by degrading a formerly superior one.

The resulting ranking order is mostly linear: hen A pecks B but is not pecked by her, B pecks C but is not pecked by her, C is thus automatically inferior to A, and so on throughout the whole flock. Quarrelling usually occurs only between individuals separated by one step of the social ladder...

The resulting social hierarchy is very rigid, and it is *absolute*, meaning that the ranking between any two given individuals of the flock, once established, is observed *at all times, in all places, and under all circumstances*. Throughout this article, therefore, it will be called "absolute social hierarchy". The main prerequisite of its proper functioning is that all the members of a community know each other individually.

This kind of social hierarchy prevails largely in communities of animals normally living together as adults and in families which break up as soon as the young are capable of looking after themselves—the parent(s) always holding the top position(s). Since the social habits of most, if not all, vertebrates living in communities have evolved in that they ceased to break up their families after the young had reached maturity, the evolution of absolute social hierarchy has its roots in family life itself.

Solitary animals would not seem to need any kind of social order. They occupy a piece of land, a so-called territory, on which they will not allow any other member of the same species to stay, the only exception being a mate during the reproductive season.

Within his territory the owner is—with very few exceptions which we need not go into here—superior to all strangers, and easily wins if an intruder should actually choose to stay and fight. His courage and self-assurance diminish as the distance from the centre of his territory increases. Thus, neighbouring individuals soon find a line of balance between them, and once such a boundary has been established neither will go beyond it.

Territories of this kind were first observed in birds by B. Altum and H. E. Howard independently. It is in birds that they have since been best and most extensively studied, with the result that bird biology and bird behaviour have largely framed the whole concept of territory.

Professor Heini Hediger of Zurich Zoo was the first to realize that the original concept had to undergo certain adaptations if it was to be of good use when studying solitary mammals. He pointed out that a mammalian territory consisted not so much

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XUM

Photo Jean-François Ferré © Fotogram, Paris

Animal communities and human societies react to overcrowding in exactly the same way, say scientists. Studying the effects of overcrowding on animals, they have found that even so-called solitary animals such as the cat have strictly organized social hierarchies, and that cat behaviour and social patterns too are influenced by overcrowding in the territories they "occupy".

of a solid area as of a number of places—first and second order homes, spots for sunbathing and resting, look-out posts and feeding areas—connected by a network of pathways. The owner of the territory moves along the paths to his various points of interest and activity according to a more or less fixed timetable, and the spaces enclosed by the pathway network are seldom or never used.

In defending their territories, most solitary mammals are at a great disadvantage as compared with birds. They cannot lift themselves onto the highest perch and from there survey the whole of their territory, and most mammals do not "mark" their presence acoustically as song-birds do. Thus they often fail to notice trespassers. The border areas of domestic cat territories overlap considerably in the sense that pathways and places of interest are shared even if the first order homes are well spaced out.

"Sharing" in this context does not necessarily mean that the animals concerned are on good terms with each other. When they meet on disputable ground they may fight. But with territorial behaviour being dependent on proximity to the territory centre (first order home) the victorious cat will not extend its pursuit of the defeated one too far into unknown territory and too far away from its own home.

Thus, unlike dominance in a group governed by absolute social hierarchy, superiority gained through territorial fighting is from the start more or less confined to the locality of the fight and, after a series of such fights at different localities, the ranking between the neighbouring individuals still applies only in the border area and may even be reversed from one spot to the next according to the distance from their respective first order homes.

Nor is this the only condition limiting the ranking order resulting from territorial fighting. The timetable of an animal's movements about its territory is constant enough to enable one formerly beaten in a territorial fight over a certain spot or path to adjust its schedule with regard to that spot so as to avoid the risk of an encounter with the victorious opponent...

From all this, it will have become apparent that, quite unlike absolute social hierarchy, any ranking between two individuals based on the outcome of territorial fighting is largely subject to *locality and time.* I therefore call it "relative social hierarchy..."

Both types of social hierarchy can be present in the same animal species. The chaffinch for instance, as the extensive studies of Peter Marler have shown, changes seasonally from one type to the other in correlation with its reproductive cycle. In the cat, absolute ranking order is normally established among the siblings of a litter, and also among the adult male cats of a region.

Males keep less strictly than females to a defined area surrounding their homes, and when rutting they tend to

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From battery hen to battery consumer

wander well beyond what may be considered as their territory proper. Accordingly they frequently meet at places which none of them claims as territory. The result, after some serious fighting, is a fixed ranking order between the males of quite a wide area, and then the serious fighting practically ceases.

Yet there is one striking difference as compared with the absolute ranking order within a group which lives together all the time: the tom cats, after meeting outside their own territorial grounds, return to their homes and into their territorial rights where their supremacy is not challenged, whatever their rank may be "outside." Here they heal their wounds and regain their confidence, and thus are never as totally and utterly subdued as the lowest-ranking in a permanent social group.

If in a region there are several tom cats almost evenly matched, they have it out with each other and afterwards are very careful not to provoke any more serious fighting, which might only endanger their position. At first this relationship resembles an armed truce, but as the animals gradually become accustomed to each other it leads eventually to friendship, in the limited sense that the animals may like being together for a while and even keep company in their pursuit of love and ... novice males.

Such a loose and temporary association of adult males I have called a brotherhood. Their competition for females attains a pro-forma quality, and it is largely the females who make the choice. Hard and continued fighting ensues, however, when somewhere in the brotherhood's region there is a young tom just reaching maturity and setting out to battle his way into the brotherhood.

Singly or together, the "brethren" walk up to the youngster's home and summon him to fight. Since the adolescent will not accept defeat as any sensible adult would, he will continue to challenge any member of the establishment until he has either won his place among them or is finally defeated and either driven out of the neighbourhood or even killed.

It would, however, be entirely wrong to deduce from the foregoing that fighting and mutual repulsiveness are the only factors forming the basis of the social structure of so-called solitary mammals. It has frequently been observed in songbirds, and even some fish, that, after fighting initially over the boundaries of their territories, they eventually come to tolerate neighbours coming close to the boundary and occasionally even trespassing, but still drive off all trespassing strangers.

With cats, relations between neighbours need not stop at sharing border areas by mutually avoiding all encounters. They may tolerate each other within seeing distance or even greet each other in a friendly manner before separating again... Thus, solitary animals are certainly not asocial and some form of friendly neighbourliness may develop.

It will be evident by now that relative social hierarchy, being associated as it is with territorial behaviour, is inseparably linked to the spacing out of the individuals of a population, that is to population density.

Density as a factor in the inner machinery of absolute social hierarchy is not so obvious at first glance. Its importance is shown best by the fact that species which under normal free-ranging conditions show no recognizable signs of any ranking within the group, for example the Brown Rat or the Night Heron, will establish absolute social hierarchy when crowded.

THE influence of the density factor can be easily studied by keeping groups of animals of either social type under conditions where density can be manipulated. The effect of increasing density on absolute social hierarchy is invariably to emphasize the tyrannical aspect of the system until life becomes practically unbearable for everyone in the group except the overlord, and in time the strain and stress of having to assert himself begins to tell even on him, whether the species under observation be doves, or wolves, or goats. Hence absolute social hierarchy is also dependent on density and room for manœuvre if it is to work without lasting detriment to the group.

With relative social hierarchy, results do not seem quite so clearcut at first. Again, cats provided us with the first clues. Other investigators as well as myself found that any given group of cats kept in close confinement did not seem to develop an unvarying rank order, although as density increased one animal, usually a male, might emerge as undisputed overlord, and one other animal or even two as "pariahs" who eventually could not make the slightest movement without provoking attack from some other animal in the group.

Since the only known kind of ranking order at that time was the one described here as absolute social hierarchy, these observations were explained by assuming that cats, being solitary animals by nature, simply lacked the potentiality for forming a stable ranking order.

Only after observation of free-ranging cats had suggested to me the existence of a second principle of ranking, namely relative social hierarchy, and after I had realized that cats are quite capable of establishing absolute hierarchy, within the litter as well as the tom cat brotherhood, it dawned upon me that what we observed in the caged cats might simply be a mixture of the two kinds. *In short with increasing density absolute hierarchy becomes more and more prominent and the manifestations of relative hierarchy dwindle away.*

Another idea arose from this: since even in animals commonly regarded as solitary and asocial some traces of communal life could be found which are governed by absolute social hierarchy, perhaps in animals normally living in large groups ostensibly governed by absolute social hierarchy there were marginal parts of their social life in which relative hierarchy prevailed? In between these two extremes there might be many animal species habitually showing some signs of both kinds of hierarchy?

There is at least some indirect evidence pointing in that direction: some species, like the African lion and the grizzly bear, have a faculty for living either as solitary, territorial animals, or in groups more or less determinedly defending group territories, according to habitat or season. Herding animals like the wapiti deer show territorial behaviour in some regions but not in others.

These observations show that both kinds of social organization are potentially present in these and other mammalian species. Taken with the results obtained from captive communities, they also suggest that the proportion of the two forms of social hierarchy has a different optimum in each species. Moreover the balance is not rigidly fixed and may be shifted within certain limits before any distinct, outward signs of behavioural disorder become manifest.

This point seems to be of the greatest importance, because it indicates the probability, if not certainty, that *well within* the apparent or obvious limits of density tolerance there are

latent tolerance limits beyond which damage is surreptitiously done long before it becomes apparent...

People undoubtedly show territorial behaviour in many forms and in many spheres of their lives. Professor Bayr-Klimpfinger of Vienna has shown that it starts in the nursery. Garden walls, no-trespassing posters, the "my home —my castle" attitude of mind, the way people and especially children are quick to stake out their claims on the holiday beach and resent all "intruders," are clear examples of this all-pervading tendency to territorial behaviour.

There is, on the other hand, hardly any need to point out examples of absolute social hierarchy in human societies, ancient or recent, primitive or evolved: chieftains, princes, kings and the carefully elaborate hierarchies of their courts, armies and management of modern big business, as well as teenager gangs, are only a few...

Nearly five years in prisoner-of-war camps taught me that overcrowded human societies reflect the symptoms of overcrowded wolf, cat, goat, mouse, rat or rabbit communities to the last detail and that all differences are merely species-specific; the basic forces of social interaction and of organization are *in principle* identical and there is true homology between Man and Animal throughout the whole range of vertebrates.

To recognize such an internal balance in man between absolute and relative social hierarchy, brought about by evolution as part of a density-control mechanism, *which limits the adaptability of the individual*, is not to deny that adaptability. What it does mean, however, is that the mental health of the individual is in danger and will eventually break down if adaptability is stretched too far beyond the limits set by evolutionary adaptation. If this happens to enough individuals to constitute a sizeable proportion of a community, then that community ceases to be stable, healthy and fit for humans to inhabit.

Density surreptitiously creeping beyond the tolerance limits may create symptoms which cannot be directly and easily traced back to it as their cause but are often attributed to factors which are merely contributory or symptomatic in themselves.

The resulting constant subliminal tension will lower the individual's resistance towards other disturbing factors. Thus I have no doubt whatever that a great number of neuroses and social maladjustments are partially or totally, directly or indirectly, caused by overcrowding.

Professor J.B. Calhoun and others have shown that crowded conditions seriously disturb maternal care in rats and mice. Likewise human mothers, according to Professor René Spitz, are deeply influenced by population density: they often cannot form and maintain the proper emotional bonds towards their babies; this in turn interferes with the child's "ego formation," with its whole character development in which early youth and proper maternal care and affection are so vastly important. Nothing shows better than this what far-reaching damage can be done indirectly to future generations by the parent generations being too densely packed.

This is our situation now, and we have already been in it a long while. What every normal man wants for himself and his family is a detached house in an adequate garden, with neighbours close enough to be found if needed or one feels like a social call, yet far enough away to be avoided at other times.

What we see instead is the cancerous growth of the huge blocks of flats of so-called satellite cities creeping out into the countryside, and very soon we shall reach the point where individuals simply cannot any longer be allowed to acquire a piece of land of their own and erect a single family house on it: in the interest of the Common Good the block of flats will have to become compulsory. Our civilization is marching with banners flying from battery hen to battery consumer.

In recent years there has been growing concern about the so-called population explosion and the measures to be taken to avoid overcrowding. However, this is mostly understood to mean that an attempt should be made only to slow down the population increase so that the production of supplies, predominantly food, can catch up, and if this is achieved everything will be fine—or so many of those in authority seem to think.

Reasoning on these lines makes it

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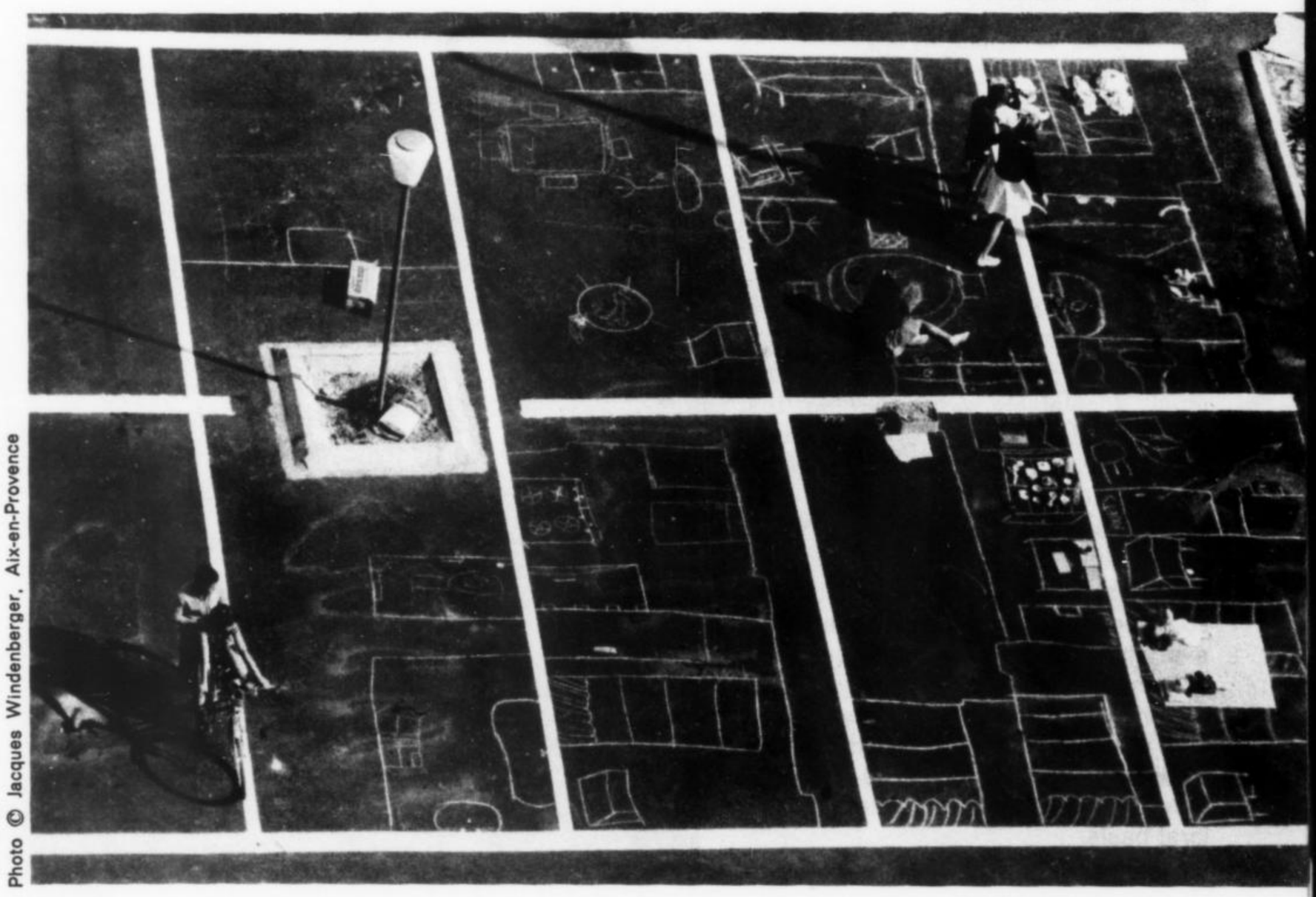

Photo © Jacques Windenberger, Aix-en-Provence

The clearly defined divisions of an empty parking lot provide an ideal area for "territorial zoning" by a group of children. Many scientists believe that, like certain animals, humans have a strongly developed sense of territory which reveals itself at an early age. Intrusion on one's "area" is often resented.

look as if controlling the population growth were mainly a problem of the under-developed countries. In the industrially developed countries, our affluence distracts from the fact that we *are* already overcrowded. We recommend birth control to the under-developed nations, but in our own overpopulated countries we still encourage large families with tax relief and even handsome allowances.

Contrary to current discussion, the danger of overpopulation does not rest solely on the need for food and shelter. It lies in whether the population will exceed the limits of human tolerance towards the presence of other humans. These limits have been set by evolutionary processes over millions of years. They cannot, therefore, be altered or trained differently within a few generations, nor can they be neglected, repressed or overstepped without seriously disrupting the internal harmony of the species.

It will be argued that my assertions run contrary to almost everything which is regarded as scientifically safe in modern psychology and sociology. The concept of adjustment is almost invariably understood as pertaining to the adjustment of individuals to environment, especially social environment. Hence, where disharmony between individual and social environment is found, this is generally explained as failure of the individual to adjust.

True as this is in some cases, it overlooks the fact that in many respects the environment fails to be adjusted to the proper needs of the individual. Modern psychologists have, in many instances at least, been so amazed and overwhelmed by the enormous range of variation found among human personalities and behaviour patterns that they have largely forgotten that all variations are but variations on the one theme, the species. Nothing can happen to or become of the individual which is not within the range of the characteristics defining the species.

But today most psychologists are so sure of the omnipotence of individual adaptability and learning that they are blind to the facts which would help to reveal exactly what is the role of genetic—that is phylogenetic—information in all the different types of human behaviour.

Yet our social psychologists and sociologists are so convinced that everything in social behaviour can, and therefore must, be trained, learned, institutionalized, that they fail to see a very plain fact: traditions and institutions would never be stable if they did not rest on an innate behavioral basis.

To the student of evolutionary pro-

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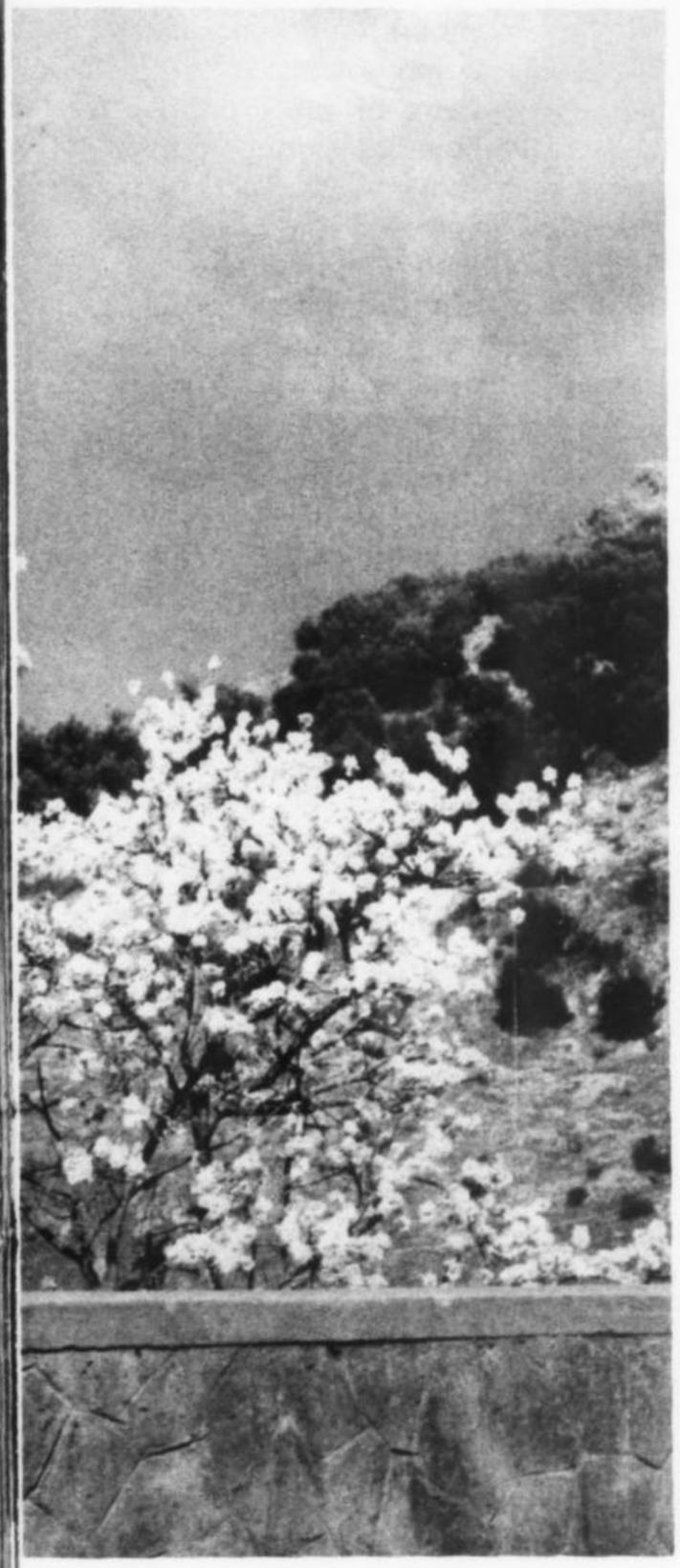
Photo Herbert © Parimage, Paris

Photo © Parimage (CP), Paris



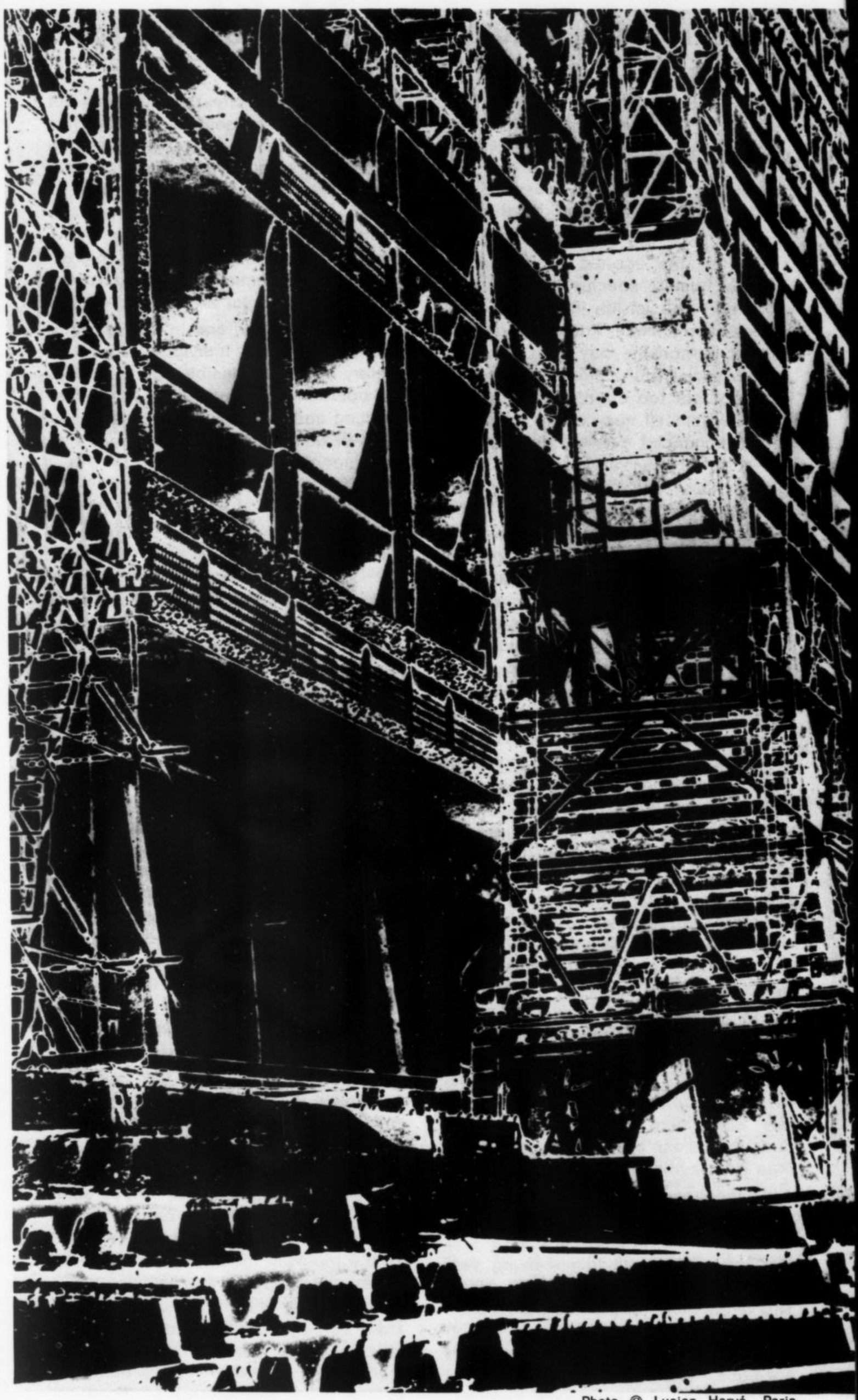


Photo © Lucien Hervé, Paris

These three photographs would seem to sum up the difference between dream and reality for the "population exploded" city-dweller of today. "Keep this space clear" the sign in the photograph, top left, says, but with every inch at a premium no one pays attention.

Overcrowding and the threat to democracy

cesses, all changes in cultural, traditional, educational, religious, philosophical and institutional attitudes appear to stir the surface only. The very core of human nature and conduct has evidently remained unchanged throughout known human history.

One of the age-old characteristics of the human species is that it is adapted to social life in a small group where each member knows each of the others personally, having a need for larger social gatherings from time to time but not too often, feeling a need to be by himself quite often, and reacting to continued oversocialization with all sorts of frustrations, repressions, aggressions and fears which soon develop into genuine neuroses. As it is a species characteristic it does not matter whether we like or regret the fact. *We have to live with it* and find conditions which allow us to live with it in comparative health, wealth and sanity.

That it is, for instance, possible to rear and train children so that they become habituated to oversocialized conditions until they are unable to feel safe and happy outside a crowd of their own kind certainly does not invalidate my point.

Children and even adults can be trained or habituated to avoid everything good and healthy, to see their only source of contentment and even happiness in regularly over-eating all sorts of palatable but unbalanced food, in continually seeking unsuitable and demoralizing amusements, in all kinds of perversions and addictions, and similarly in living continuously in a crowd. Robbed of these conditions, the afflicted individual will feel thoroughly dejected and miserable. Yet this "adjustment" to mass communities does the human species no more good than drug-addiction or alcoholism.

As mentioned earlier, all *structurally* organized vertebrate communities depend for their internal structure and function on the individuals being personally acquainted with each other. This is the most fundamental difference between such communities, which therefore rightly deserve to be called societies, and the highly organized communities of bees, ants and termites, in which individuals in the sense of known personalities are wholly unimportant and, as a matter of fact, not to be found: any given individual will do for a certain function provided it is of the right "caste" or in the right phase of its life cycle.

In a vertebrate community, however, which is not solely governed by absolute social hierarchy, the individual not only acquires personality, he also has some place, some preserve, where he is superior to all other members of the community. No matter how big or small the territory may be, and no matter what the ranking of the individual in the various absolute hierarchies of the community, as a territory owner he is equal among his equals.

In this capacity, and in this capacity alone, the human individual is able to enter, as a responsible, participating, co-operating, independent, self-respecting and self-supporting citizen, the type of communal organization we call a democracy.

OVERCROWDED conditions are thus a danger to true democracy which it is impossible to exaggerate. Tyranny is the almost inevitable result, whether it be exercised by personal tyrants or by an abstract principle like the Common Good, which is no longer any good at all to the mass of individuals. *For this is an unalterable law:* as long as density is tolerable, sacrifices made for a common cause will, one way or another, pay dividends to the individual and contribute to his own fulfilment. Beyond this point, however, the demands of the Common Good rise steeply, and what is taken away from the individual is gone for good; he cannot even see that it goes in any sizeable amount to others, for they are likewise robbed without reward.

If, in accordance with V.C. Wynne-Edwards's theories, the innate balance of relative and absolute social hierarchy once served as density control mechanism and thus ensured that social life did not develop into unbearable social pressure, why has it now apparently ceased to function in man? To the biologist the answer is obvious; hardly any biological mechanism works independently of others and faultlessly. Thus density tolerance in humans is adapted to a certain level of child mortality, to a "natural" percentage of people dying prematurely of diseases and plagues, and so on.

Scientific and technical progress has altered all this, but it could not and has not altered the basis of human social behaviour and happiness which has been built into each individual by at least five hundred million years of vertebrate evolution. This cannot be altered in harmony with the whole except by that same, slow process of evolution, taking countless generations, and any attempt to force it will only result in the destruction of our own species.

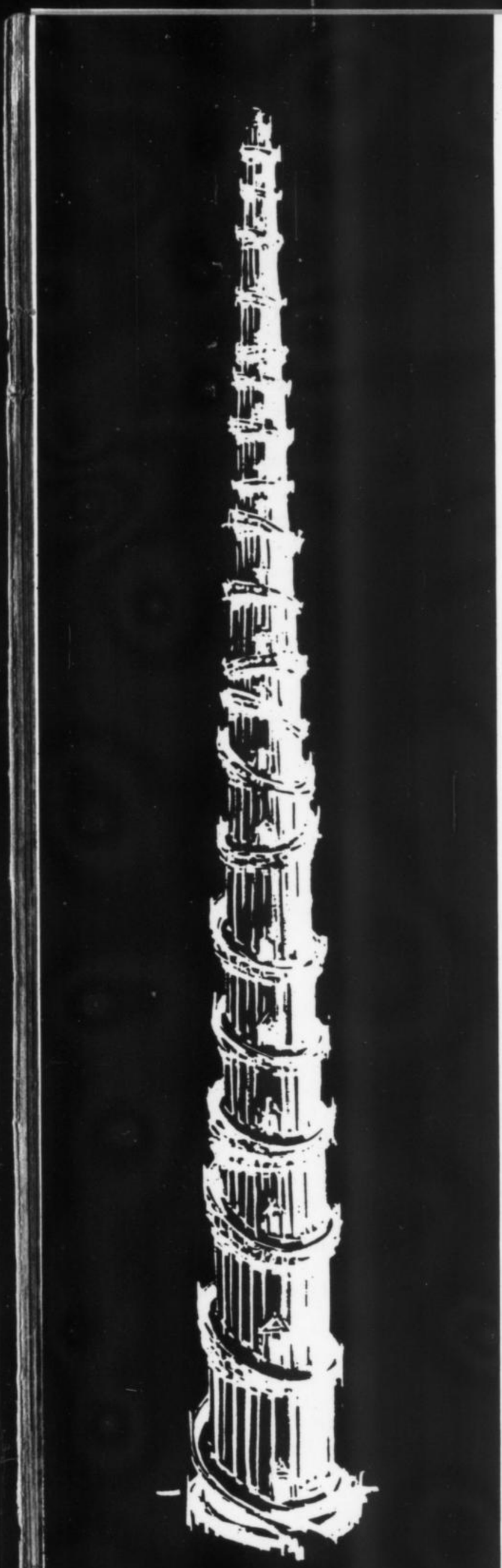
But the density control mechanism described here at length can be revived and brought into its natural and beneficial function again if we use our rational powers to restore the equilibrium, and use them swiftly and efficiently. It is no longer a question of forestalling future overpopulation: we must not only call a halt to further increase, we must find ethically and psychologically acceptable means of slowly shrinking numbers back to less than the present, to a sane density level. There is no time to be lost.

At present most people seem paralyzed by fear of The Bomb, but the bomb in itself is no danger. The only real danger to Man is men, too many men. Statisticians have forecast that by 2040 the world population will have reached 22,000 million. By then production may possibly be capable of feeding, clothing and battery-keeping these numbers; but then nobody will be able to move without being impeded by numbers of other people moving, and without interfering irritatingly with their movements. At least half the population will have to be psychiatrists tending the neuroses of the other half. To this future population, the bomb will no longer be a threat but a temptation: it will appear as the salvation from all evil.

I think we all agree that we want neither the extinction of our species, or at least of many future thousands of millions through the bomb, nor the re-establishment of the old, cruel methods by which nature balanced our numbers.

Thus the only way remaining is humane density control—birth control. It can be done. Automation, if properly used, can allow us to keep and even enhance our living standard with a slowly decreasing number of young working people.

At present, under the influence of an economic theory which regards ever-growing expansion as the aim of all economy and automation as a means of stepping it up even farther and faster, it can end only as all unchecked positive feed-back mechanisms end: in catastrophe. The choice is still ours: do we want rational regulation and—for some time—reduction of numbers, or unrestricted procreation and the Bomb as Ultima Ratio? ■



An imaginative 17th century concept of the Tower of Babel engraved on copper—one of many versions of the Tower conceived by artists throughout the centuries. The raising of the Tower is related in the Old Testament and differing descriptions of the building were given by the Greek historian Herodotus (4th century B.C.) and the Greek geographer Strabo (1st century A.D.).

Drawing © Donald Thompson

THE TOWER OF BABEL

by Friedrich Ragette

AS told in the Old Testament (Genesis: 11) the story of the Tower of Babel is one of the most fascinating stories of all time. It tells, concisely, of man's efforts to build a great tower into the heavens, of God's wrath at such arrogance and of the curious punishment He imposes. It has colour, excitement and a moral that is plain to see:

"*And the whole earth was of one language, and of one speech. And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar; and they dwelt there. And they said one to another, Go to, let us make brick and burn them thoroughly. And they had brick for stone, and slime had they for mortar. And they said, Go to, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth. And the Lord came down to see the city and the tower, which the children of men builded. And the Lord said, Behold, the people is one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do. Go to, let us go down, and there confound their language, that they may not understand one another's speech. So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city. Therefore is the name of it called Babel; because the Lord did there confound the language of all the earth: and from thence did the Lord scatter them abroad upon the face of the earth.*"

The moral of the story, of course, is that man should keep his place and not aspire to God-like creativity. But down through the centuries the theme of the story—man the builder challenging God the creator—has been interpreted and reinterpreted according to the age.

In medieval times the moral element —pride goeth before a fall—was uppermost. During the dynamic, self-confident Renaissance the story was an occasion to celebrate the ingenuity and adventurousness of man. In the Space Age, the era of nuclear fission, it might well express renewed doubt about the ultimate results of man's endeavours.

The story has had a particular appeal to artists. From faithful artisans carving simple versions on cathedral walls for the enlightment of unlettered peasants to imaginative giants like Brueghel, painting his splendid works for the pleasure of the world, it has been a fruitful subject for invention and enlargement.

Perhaps it was the idea of man's recurring ambitions to create structures as high and as everlasting as possible. Perhaps it was the intriguing picture of thousands of workers suddenly breaking out into strange incomprehensible tongues. Whatever the reason, it touched the artistic imagination and brought forth almost as many versions of the tower as there were artists attempting to depict it.

Some saw the tower as an early version of the leaning tower of Pisa. Some saw it as a massive pile of receding blocks of stone. Others likened it to a great wedding cake. Only a few turned to the surviving descriptions of what the tower actually looked like.

One of these descriptions came from the attempt Alexander the Great made to rebuild the tower after he found it in ruins. (Some 10,000 workers cleared away the rubble but with Alexander's death in 322 B.C. the project stopped.) Another, earlier description came from Herodotus, the Greek his-

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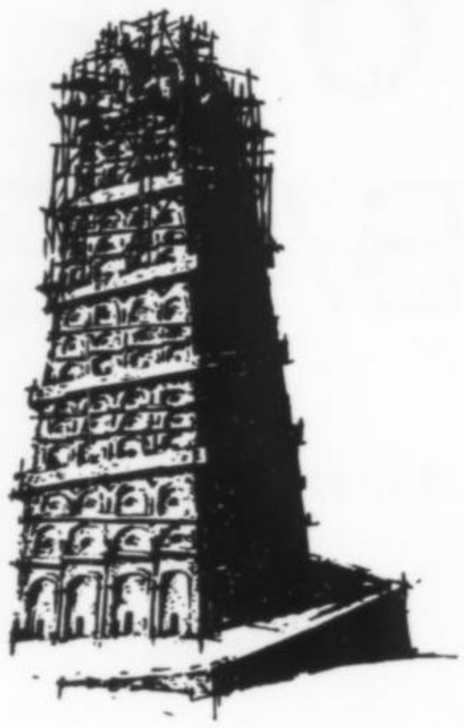
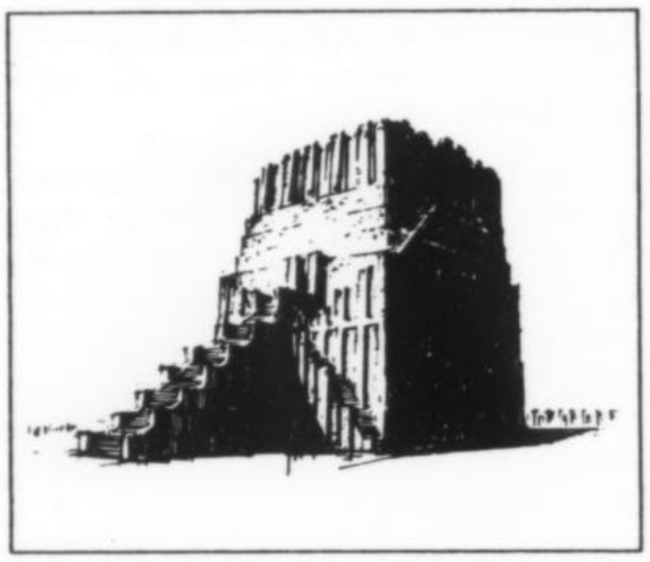
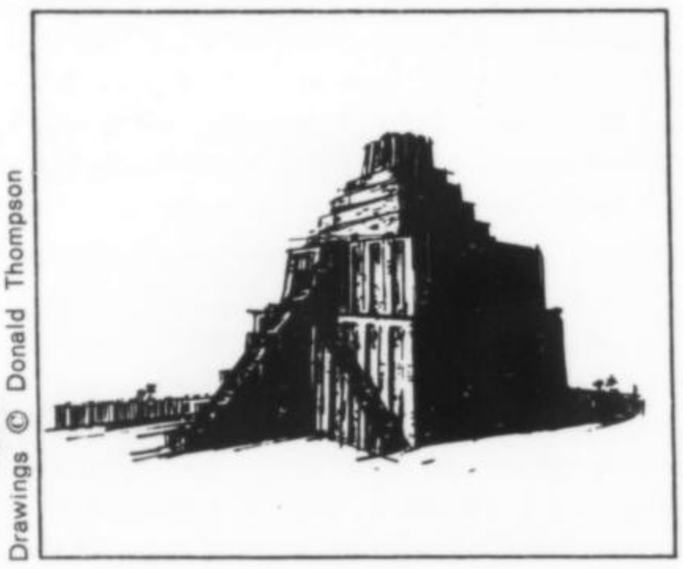


How a 16th-century Flemish painter visualized the Tower of Babel. The artist may have been inspired by the account of Herodotus which describes a square based tower with stepped-back storeys and a spiral staircase to the summit.



Texts and inscriptions dug up in Mesopotamia in modern times have led archaeologists to suggest that the legendary Tower of Babel may have been one of the "ziggurats", tower-like temples erected by the Sumerians, offering their gods a stepping stone between heaven and earth. Above, a suggested reconstruction of the Tower of Babel made in 1918 by the German archaeologist Robert Koldeway, who excavated many sites in Mesopotamia and wrote several books on Babylon. Below, another archaeologist's reconstruction in 1930 also recalls the form of Sumerian "ziggurats".



Drawings © Donald Thompson

A scoop for Herodotus

torian who visited Babylon about 460 B.C. and gave an eye-witness account:

" *In the midst of the temple a solid tower was constructed, one stadium* (about 200 yards) *in length and one stadium in width. Upon this tower stood another, and again upon this another, and so on, making eight towers in all, one upon another. All eight towers can be climbed by means of a spiral staircase, which runs around the outside. About halfway up there are seats where those who make the ascent can sit and rest. In the topmost tower there is a great temple, and in the temple is a great bed richly appointed, and beside it a golden table. No idol stands there. No one spends the night there save a woman of that country, designated by the god himself. The priests told me that the god descended sometimes to the temple and joined her... but I cannot believe this.*"

With such a tangible description on record one would think there would be no doubts that the tower of Babel really existed. But since Babylon, for more than 20 centuries, was really little more than a name—a vague legend of grandeur and a few undifferentiated mounds of earth in Mesopotamia—serious historians still tended to dismiss the story as no more than an interesting legend.

Then, in 1854, the British Foreign Office notified its consul in Basra, Mr. J. E. Taylor, that the British Museum wanted someone to search out ancient ruins in southern Mesopotamia. Mr. Taylor obliged and in excavating those undifferentiated mounds uncovered the top of a large man-made brick structure and some clay cylinders on which was written, in cuneiform, the history of the building.

They were not startling discoveries but they did point the way for the expedition in the 1920s during which Sir Leonard Woolley, under the auspices of the British Museum and the University of Pennsylvania, found the famous "Ur of the Chaldees," the birthplace of Abraham, and unearthed evidence that the stories of ancient Babylon were not legend, but history.

It had been a splendid history while it lasted, rivalled only by that of ancient Egypt in brilliance and depth of civilization. It began sometime in the fourth millennium before Christ when a non-Semitic people called the Sumerians descended from the mountains of Persia and settled on the fertile plain between the Tigris and Euphrates rivers. They built cities, invented cuneiform writing, and perhaps the wheel, channeled the waters of the nearby Euphrates into a remarkable irrigation system, perfected the art of the goldsmith and built great towers of bricks made of clay. From them, eventually, evolved the Babylonian civilization, the centre of which in the waning centuries of Mesopotamian importance, was Babylon, "the Glory of Kingdoms."

By any standards Babylon was a magnificent city. Sprawled along the banks of the palm-lined Euphrates, Babylon was a great metropolis of broad avenues and high buildings, numerous temples and great walls. Through the magnificent Ishtar Gate, a structure of yellow brick adorned with lions and bulls in glazed blue tile, streamed thousands of merchants, soldiers, priests and farmers. Armour glittered in the sun and chariots clattered down the avenues to the river.

Beyond the city walls, lush fields of wheat, clusters of fruit trees and small

CONTINUED PAGE 39

Colour pages

Opposite : Pieter Brueghel the Elder produced two famous paintings of the Tower of Babel. This detail is of the one in the Boymans-van Beuningen Museum, Rotterdam, a work executed on wood and measuring 60 by 74 cm. (2 by 2½ ft.). Tiny ant-like figures swarm over the half-completed building and the artist has included naturalistic details such as the transport of brick and lime, leaving their powdery red and white traces on the tower. The works of Pieter Brueghel, the foremost of a famous family of Flemish painters (and called "the Elder" to distinguish him from his two famous painter sons) reveal the everyday life and new ideals of the prosperous Flanders of his day (16th century) where a strong current of humanistic thought had replaced many outmoded medieval attitudes and beliefs. The second tower is published in colour opposite page 39.

Overleaf: Right, the complete Rotterdam painting showing the mighty tower piercing the clouds and reaching up to heaven. Its tremendous bulk dominates a lush countryside, a seascape and a bustling port recalling Antwerp which, in Brueghel's time, was already a famous centre of international trade. Left, another detail of the painting. Brueghel imagined the structure as an intricate system of Roman arches and vaults. But the ziggurat temples of Mesopotamia, which may have inspired the idea of the Tower of Babel, were a solid mass of masonry.

Photos A. Frequin © Musée Boymans - van Beuningen, Rotterdam

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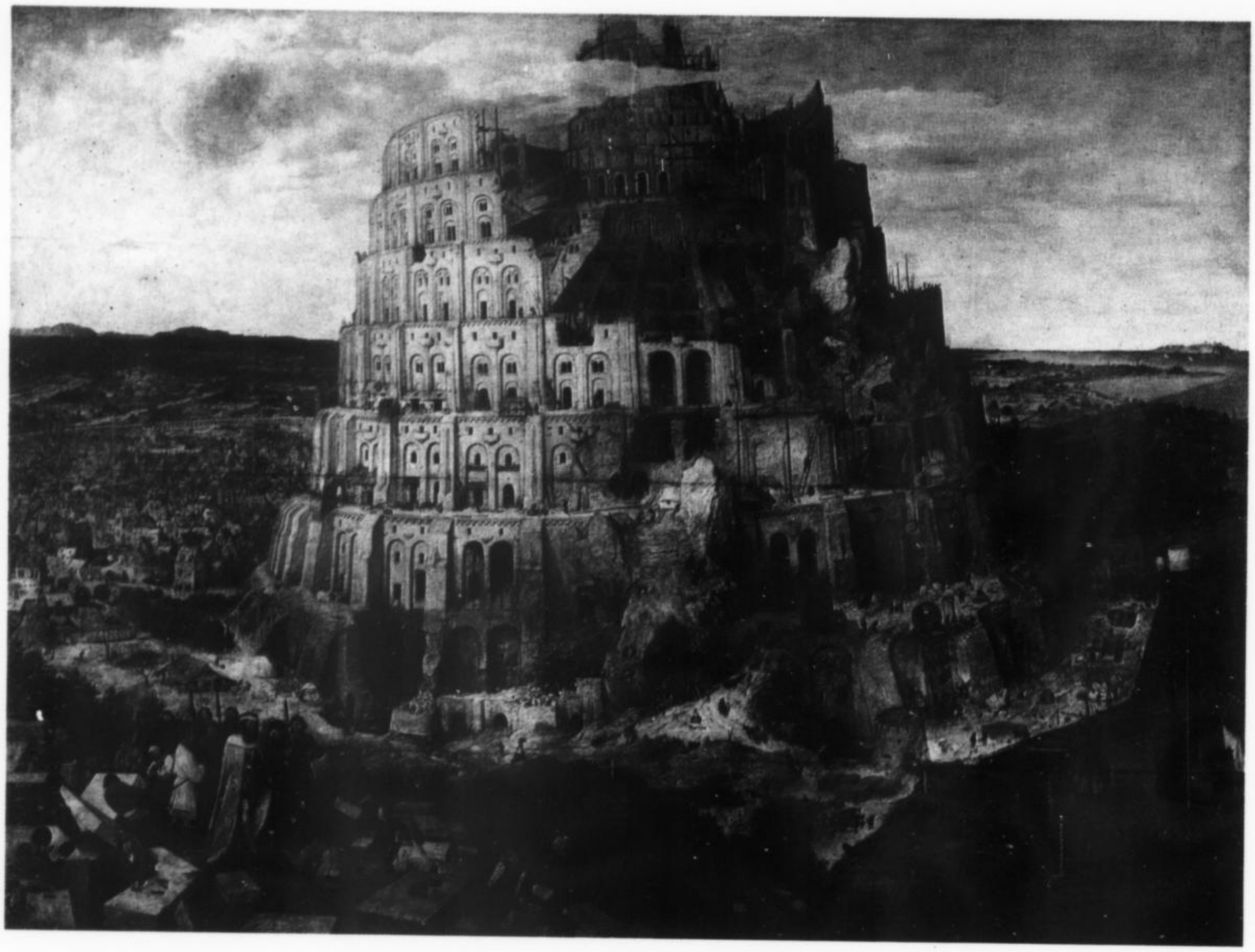

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Photo © Kunsthistorisches Museum, Vienne, Autriche

Opposite: Top, Pieter Brueghel's second "Tower of Babel," in the collection of the Vienna Kunsthistorisches Museum. Larger than its Rotterdam counterpart (144 by 155 cm; 4ft. 9 ins. by 5ft.), it is painted on wood and dated 1563 by the artist himself (the Rotterdam work is undated). The imposing building recalls the Coliseum which Brueghel saw in 1553 when he visited Rome. In the foreground, architects and masons greet an emperor during construction, but dress and equipment are 16th century. In this version too the tower rises above a large port; in the background is a town with typically Flemish houses. Bottom photo, detail of the upper part of the Rotterdam "Tower of Babel". A comparison of the structures in the two paintings shows that in both Brueghel drew inspiration from the solid symmetry of Roman amphitheatres.

Photo A. Frequin © Musée Boymans - van Beuningen, Rotterdam

The masons of Sumer longed for the mountains

gardens extended almost as far as the eye could see. And high above, looking down on this magnificence and out across the plains from a height of nearly 300 feet, stood the great tower that the ancient Jews, herded into Babylon for 70 years of captivity, were to describe to the world as the Tower of Babel.

In digging out the history of Babylon, archaelogists found that in every important ancient town in the land between the rivers there existed the remains of towerlike structures called *ziggurats*. They also discovered representations of stepped towers on seals, amulets, cylinders and bas-reliefs, as well as cuneiform texts giving the names and dimensions of the towers.

Eventually, near what is now the village of Hilleh in Iraq, they uncovered the ground plan of a particularly large tower. It was made of burnt bricks and was some 300 feet square. Texts found in the ruins called it "Etemenanki, the House of the Foundation of Heaven and Earth."

The texts also told of its restoration during the reign of Nabopolassar in 625 B.C., mentioned baked bricks, streams of bitumen, the counsel of Babylonian gods, and, some 60 years later, the conscription of foreign labour by the famous Nebuchadnezzar to continue the restoration.

It all fitted. This was the Tower of Babel, and the Tower of Babel, although perhaps larger and more important, was no more than another of the *ziggurats* that dotted the Mesopotamian plains. Thus they had at once confirmed the Biblical story and produced at least a possible explanation of its combination of two unrelated subjects: the building of a tower and the diversity of languages among men.

For thousands of years, apparently, *ziggurats* were an integral part of Mesopotamian cities, each differing from the other in detail like the cathedrals of Europe, but essentially the same: massive cube-like blocks, with stepped-back upper terraces, and monumental stairways leading to upper sections from which spiral stairs ascended to the topmost platform on which stood a temple or shrine.

Inevitably they reminded the explorers of those other marvels of ancient engineering, the pyramids of Egypt. But while the pyramids were tombs, built by individual rulers to provide safe resting places for their bodies and to ensure their comfort in afterlife, the *ziggurats* were clearly places of worship, built, enlarged, restored, and embellished by generation after generation. Why, archaeologists wondered, was such tremendous labour expended to give them this form?

From available evidence, the answer seems to be this. The Sumerians originated in mountainous country. They frequently depicted their gods standing on mountain tops, and many of the animals in their art are of a mountain type. When they migrated to the plain, they did not change their religion but, where nature had failed to provide mountains, they fashioned their own out of the only material available to them: clay bricks.

Thus, far from challenging God as the Hebrews thought, the Sumerians and their successors worshipped from the *ziggurats*, and offered their gods a stepping stone between heaven and earth in the hope that they would descend and follow them to their new habitat.

As to the second part of the story, God's decision to "confound their language," one theory is that the captives might have mistaken the sacred name of Babylon, *Bab-ili*, meaning the gate of God, for the Hebrew *balal*, meaning confusion—an ironic twist in a story about a confusion of tongues.

Another theory is that because many nations had traversed the plains of Mesopotamia, Babylon probably housed people of many races—remnants of older inhabitants, slaves and conscripted labour, perhaps business or diplomatic representatives of neighbouring tribes—all speaking different languages or dialects.

To the simple nomadic Jews, marched off from their pastoral lands 800 miles away and set down in this teeming city, the diversity of language was unsettling and mysterious and called for an explanation. In the habit of seeking theological explanations for all human phenomena, they may have concluded that the confusion of tongues was God's curse on the Babylonians for setting up strange religions and for constructing these arrogant towers into the heavens. That, in any case, is how they told it and why, ever since, Babel has been a warning to man to limit his pride and put a rein on ambition. ■

WAR IS NOT IN OUR GENES

by Sally Carrighar

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THERE are still men and women living who can remember the horror which greeted Darwin's theory that we are "descended from apes." That phrase probably accounted in part for the revulsion because "descended from" was generally used in a more personal way—"I am descended from Scottish ancestors," that is, I am one of them, I am like them. Darwin meant, of course, "We have evolved from apes," with apes standing in for the whole range of evolved animals.

The first, grudging acceptance of evolution was in connexion with physical structures: it was hard for anyone to deny such evidence as the development of a thinking cortex on top of a simpler brain. The idea of the evolution of *behaviour*, however, has been slower to win support, for there is no "fossil behaviour." From fossil bones, guesses can be made as to the ways that the bones were used, but how can anyone ever reliably know the origins of the habits of today's animals—or of our own?

Nevertheless, the evolution of behaviour is now inspiring one of biology's hottest debates.

Darwin himself laid the groundwork for it when he wrote *The Expression of the Emotions in Man and Animals*, and showed how closely alike the signs of emotion are. This book was largely ignored, at least in its implications, for the mechanical age had arrived and there was more interest in putting captive animals into pieces of apparatus, in testing their reflexes, their ability to find their way out of mazes, to count, and to discriminate between colours and forms—problems like these.

About 1950, however, a group calling themselves ethologists broke out of the laboratories, declaring that the most reliable facts about animal behaviour are secured by watching animals in their natural habitats. From the discoveries made by these thoughtful observers, it soon became clear that we really don't know very much about how most animals lead their lives, about what animals do. Dr. William H. Thorpe of Cambridge University was one of the first to stride boldly on to the battlefield with the statement: "There is hardly any aspect of the behaviour of animals which may not have some reference to problems in human behaviour."

Some ethologists fell on that battlefield and went back to the laboratories. The ones who stayed in the field had to endure some ridicule; they were called Boy Scouts and taunted with the criticism that their work could not be a science since most of it was done without experimentation. Some of this obviously stung, for few ethologists are now simply trying to fill in the great gaps in our knowledge about the daily lives of wild animals. Work in the field must now include experimentation, and some ethologists are even confining the animals that they study in artificial environments which they call "semi-wild."

Meanwhile, the behaviour of animals has fascinated the non-scientific public. Readers devour Joy Adamson's Elsa books, George Schaller's reports of his gorilla companions and those of Jane van Lawick-Goodall about the chimpanzees with whom she and her husband live. An increasing number of popular films and television programmes about animals whet this interest. And if orthodox biologists hold out against assuming any lines of descent in human behaviour, from all sides laymen are asking what we can learn from living animals.

What about the relationship between the sexes? What about care of the young and their training, about the health of animals and how they maintain it, their feeding habits, how they relax and the ways in which they play? Above all, with war so great a threat in our lives, what about a n i m a l aggression?

This last has been the subject of two recent and readable books: *On Aggression*, by Konrad Lorenz (the noted Austrian zoologist), and *The Territorial Imperative*, by Robert Ardrey (American writer and anthropologist by avocation). Both authors declare that fighting is an instinct which demands expression in virtually all higher animals—and also in ourselves because, they claim, we have inherited this compulsion. Before examining their arguments, however, it is first necessary to define exactly what is meant by aggression.

Most laymen would think at once of predatory attacks on prey for food: the pursuit, the pounce, the kill. The biological definition, however, excludes this kind of slaughter because it involves no malice. A wolf bringing down an ill or aged caribou (a strong caribou can outrun a wolf) is no more angry than we are when we buy meat at the butcher's shop. He is merely hungry.

Nor is there any true aggression, any malice, between members of different species going about their separate ways in the wilderness they share. They seem to recognize that each has different needs and perhaps, in their inarticulate way, they even recognize that other species have rights. On a path used by many or at a water hole or salt lick, the weaker and smaller animals await their turn, letting the stronger go first without argument.

Aggressiveness in its strict biological sense, and in the sense that Lorenz and Ardrey use the word, is expressed between two members *of the same species* when both want the

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SALLY CARRIGHAR *has spent more than 30 years studying animals in their natural habitats. Out of this experience she has written a number of widely-read books, including "One Day at Teton Marsh", "Icebound Summer", her observations of Alaskan wildlife, and "Wild Heritage", a summary of modern studies of animal behaviour and the insights they shed on the behaviour of people. Article © 1967 by the New York Times Company.*

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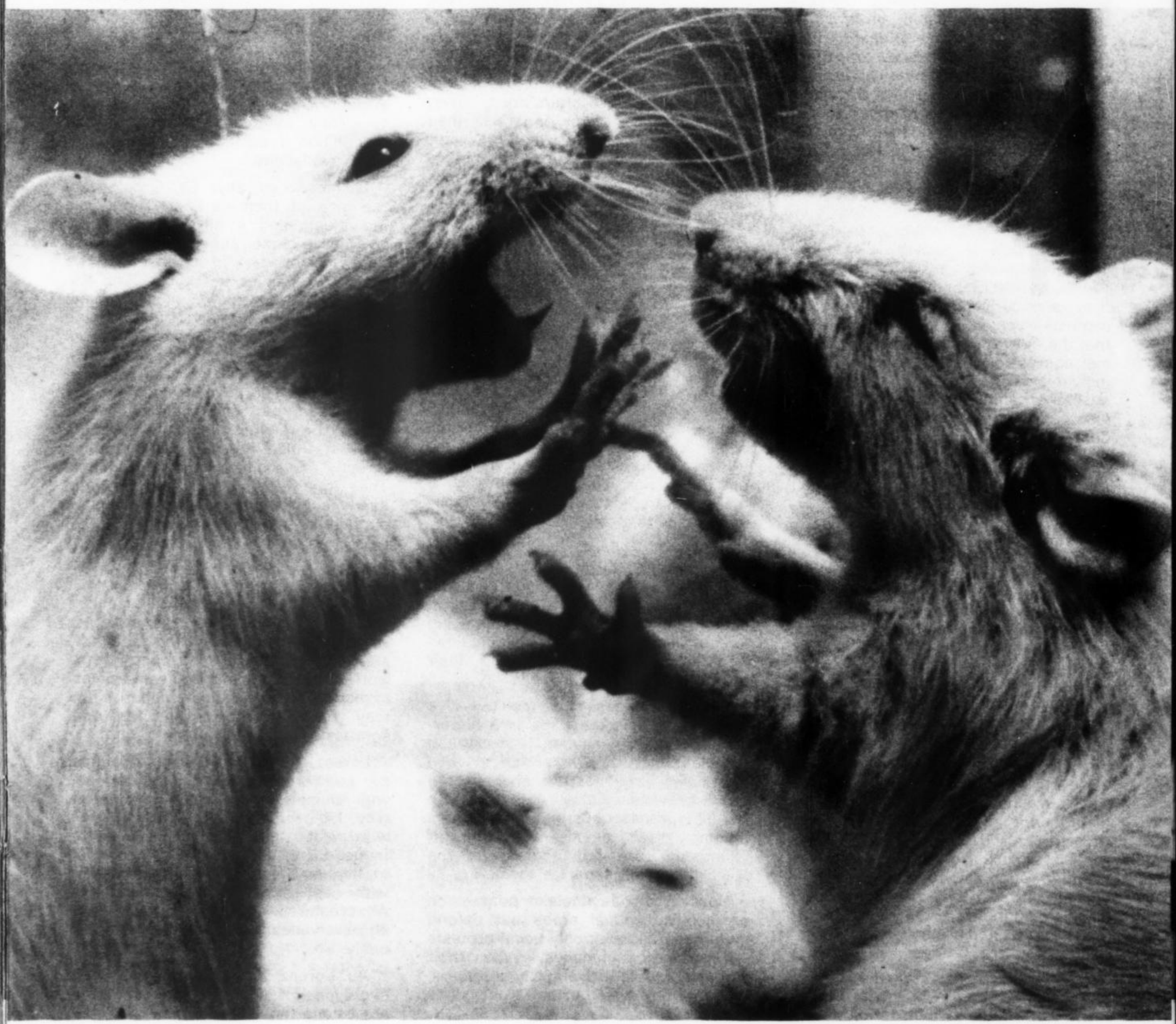
The Latin proverb "homo homini lupus"—man is a wolf to man—has been taken over by nearly every society which derives its customs, laws or language from ancient Rome. This is a libel on the wolf, which is a gentle animal with other wolves. More appropriate would be "homo homini mus rattus"—man is a rat to man—for, exceptionally among carnivores, some rats kill other rats, just as man kills others of his own species.

Photo Jerzy © Réalités, Paris



Rats, clans and captivity

same thing. With the great majority of animals, this same thing will be living space in which to raise the young of the year—an animal's home site, also known as his territory.

Sometimes aggressiveness is aroused over possession of a desired female or over rank in a hierarchy. Biologists often call the space around a disputed female a territory. It moves when she moves and the male, going along, will not allow another male to approach within a certain well-understood distance.

Lorenz and Ardrey both tie their definition of aggressiveness in mankind to home territory. They call attention to properties marked with "No Trespassing" signs and—this is their ominous and essential theme—they extend the concept of farms or suburban lots to the nation, claiming that men fight to preserve or expand their national boundaries almost as involuntarily as they would their homes. They fight the soldiers of other nations because their remote animal ancestors once instinctively fought for nesting site, burrow, hunting range or the space which encircles a female.

THUS both Lorenz and Ardrey are convinced that war is an instinctive compulsion. Lorenz says that the most important function of animal aggression "is the spacing out of individuals of one species over the available habitat, in other words, the distribution of "territories." He concludes: "There cannot be any doubt, in the opinion of any biologically minded scientist, that intra-specific aggression is, in man, just as much of a spontaneous instinctive drive as in most other higher vertebrates."

Ardrey, for his part, says: "If we defend the title to our land or the sovereignty of our country, we do it for reasons no different, no less innate, no less *ineradicable* than do the lower animals" (italics added). He also says: "All of us will give everything we are for a place of our own." And: "I believe man's innumerable territorial expressions are human responses to an imperative lying with equal force on mockingbirds and men."

Now, a widespread belief that human wars are instinctive, by which biologists mean inevitable, would of course tend to make them inevitable. Therefore it seems worthwhile to inquire whether aggression is universal in animals and just how insistent an urge it is. If aggression, as these authors insist, is a doom carried in human genes, we are predestined to wage wars and hopes for peace would seem to be slim.

It must be agreed that during mating seasons, at least, disputes over territorial boundary lines are prevalent. Spring when most animal young are born and many conceived, is a time of much sparring for areas on which to raise them and find their food. But for some species, late summer and fall are the rutting season, and that is the time when the "territories" surrounding females are fought for. In most cases, such aggressive behaviour is related to reproductive needs.

To the creatures themselves, territory probably means home in the same way that home, for us, means more than house. To them the need may be temporary but it is not surprising that they instinctively fight for it.

But how universally and how desperately? The doom of eternal war would not seem so inescapable for us if some animals—indeed, if *any* of them —can escape the compulsion.

Caribou have no territories; neither do elephants. Sea otters don't. They copulate in the water and raise their young in fronds of seaweed. Whales are not likely to have individual home sites, although no one knows definitely. Lemmings live in villages, shallow excavations in the Arctic frost mounds, with several lemmings sleeping together in each nest until a gravid female is about to give birth, when she makes a nest of her own.

These could be called colonies. There are numerous animals in the temperate zone who have communal dwellings: gophers, prairie dogs, marmots. What goes on in their hidden worlds, at each stage of the annual cycle, is imperfectly known for most species. Some colonies defend the territory shared by all; it appears that others do not. Within the burrow it is customary for an individual family to defend its own unit.

What of cowbirds, which lay their eggs in other bird's nests and then are off to live on the backs of cattle (formerly bison), feeding on the parasites in their hosts' fur? It is amusing to speculate on whether individual cowbirds claim certain cows as their territory. It seems unlikely.

Among primates, most monkeys live in groups. In some there is a hierarchical social organization. Usually the dominant male has first choice when a female is in oestrus and discord often prevails. Other groups are sexually promiscuous and among them fighting often seems abhorrent. If youngsters are too aggressive, the adult males will separate them.

Howling monkeys claim possession of their communal areas but defend them generally with only vocal protests —as do gibbon families. When their screams fail to drive away intruders, gibbons may bite, but such occasions are rare.

The English ethologist J.H. Crook discussed the question of territory in The Listener, April 6, 1967. He explained the very flexible attitude of some birds and animals usually thought to defend territories. A territory "allows an individual to develop a close familiarity with a locality. This increases its food-finding efficiency and the speed of finding refuge from enemies." But some ducks that mate on their wintering grounds, or on migration, will accompany a new spouse to its home site instead of returning to their own.

Species may change territories in response to local conditions. In drier years, certain marsh-dwelling weaver birds will disperse their nests over a large ground area; in wetter years, they may congregate in a large tree islanded in a flood pool. Harem groups of the gelada baboon wander independently in poor feeding years but "congregate in large herds of variable size under conditions of plenty. They have no territories, their disposition directly reflecting the local food availability."

Chimpanzees, says Dr. Crook, vary the size of their parties. As a rule individuals and small groups wander over large home ranges and "territorial behaviour appears to be absent." The facts are complex he says. "The dispersion pattern itself must depend largely on learning and tradition, and this is particularly so when we are talking about advanced mammals such as the monkeys. The sort of territory-holding present is more likely to be determined by the commodities for which the higher mammals compete than by any species characteristic directly determined by the genes. Thus in different ecologies, territorial systems will vary or even be absent altogether."

ARDREY is not a biologist, as he himself explicitly and creditably states in his book. In reporting the work of professionals, he seems simply to have misjudged the emphasis that they put on territories and territorial aggression.

Lorenz, of course, is an ethologist of world repute, but his experience with animals is limited in a different way. He has done most of his research with tamed animals, such as geese induced by guard fences and food to live in a human environment, and with captive cichlid fishes in tanks. All creatures so confined have their aggressiveness heightened enormously.

As Lorenz himself explains, these two types of animals, fish and birds, are among those which demand "indiv-

XUM

idual distance," meaning that they do not welcome, at any time, anywhere, the close approach of their con-specifics (the biological term for others of one's own species). Lorenz's fish and geese, disturbed by the enforced intimate association with their mates, have worked out rather elaborate rituals for "redirecting" their aggression—from mates to neighbouring males. Since these are only symbolic attacks, the adjacent male seldom is injured, and the spouse, with his aggression now neutralized, returns to his mate triumphant.

Rituals *of the same sort* are not employed by our own class of animals, mammals, for mammals are "contact" species—that is, they seek and enjoy the touch of their own kind. This distinction between animals who want and those who do not want to be near their con-specifics is only mentioned briefly by Lorenz, but it is actually of the most basic importance.

Lorenz sets out in detail the observation that among all strongly aggressive animals there is a very powerful inhibition against killing con-specifics. Since they do, unavoidably, often annoy one another, however, various behaviour patterns have become established to prevent fights with lethal consequences.

LORENZ describes the well-known reaction of a defeated wolf. As soon as he recognizes that he will lose a fight, the wolf turns his head away, a movement that the victor immediately understands and accepts. When Lorenz described this wolf behaviour in 1952 in *King Solomon's Ring*, he spoke of it as the loser "offering his neck" to his opponent—moving evidence of good faith between wolves, inasmuch as the victor always withholds the final bite.

Since that time, Lorenz has more firmly become a "mechanist." In *On Aggression*, he describes the loser's behaviour as one of the "submissive or appeasing movements [which] have evolved from juvenile expression movements persisting into adulthood. This is not surprising to anyone who knows how strong the inhibition against attacking pups is in any normal dog." But however defined, the wolf ritual works; it prevents the killing of a con-specific.

Another form of ritualized, harmless fighting is the "tournament," such as the pushing contest between two ungulates (deer or other hoofed quadrupeds) during the rut. If they really wanted to kill each other, they would attack with their hoofs (as they do a predator). Instead they literally lock horns, each trying to make the other give way. As soon as one knows himself to be losing ground, he disengages his antlers, turns and runs, and the winner goes back to his females.

Perhaps from their concentration on the subject, both Ardrey and Lorenz seem to have exaggerated impressions of the amount of con-specific aggression.

When Lorenz writes of "all this fighting," and fighting as being "such an ever-present process" in nature, he is describing a wilderness that would not be recognized by those who, like myself, have lived there for years at a stretch.

On some mornings one finds blood on the snow where tracks of fox and hare collide, but that is evidence of predation, not the encounter of an animal with another of its own kind. Real aggression, usually reproductive in its origin and purpose, concerns the animals so briefly that most of the several dozen species I am familiar with spend far more than half their time—some of them as much as 11 months in the year—in casual or amiable association with their fellows.

Typical are black bears. After a rather perfunctory but successful courtship, a male returns to a drowsy life, the daytime often spent in a copse with four or five other males. They do, however, show animosity toward one of the off-shade bears that are a colour phase of their own species. The forest rangers say that these rejected bears become neurotic.

Both Lorenz and Ardrey distinguish too briefly between offensive and defensive fighting. Is one who defends his territory "aggressive?" If not, if only an invader is properly so described, how many do thus intrude? Extremely few, except in captivity. Among wolves, one who comes into the territory of another's family may be seeking companionship (a "lone wolf" is usually an orphan). According to most observers, he is not attacked; he is simply threatened and he leaves—and is not pursued to the border.

Those who describe the wilderness from a domestic garden like Darwin's or Lorenz's fenced enclosure and laboratory or Ardrey's library, tend to put the emphasis on a few, dramatic animals like rats, wolves and lions.

Rats are contact species, and to explain some fights he saw among rats, Lorenz suggests that they were not personal confrontations, that rat clans tend to kill all outsiders. Such group aggressiveness would seem especially ominous because of the possible analogy with mankind's national wars. But here, as with geese and fish, Lorenz is presenting evidence provided by captives, and captives held in conditions so unsatisfactory as to stimulate fighting.

As Lorenz describes them: "Steiniger put brown rats from different localities into a large enclosure which provided them with completely natural living conditions. At first the individual animals seemed afraid of each other; they were not in an aggressive mood, but they bit each other if they met by chance, particularly if two were driven towards each other along one side of the enclosure, so that they collided at speed." (Most biologists, incidentally, would not call the conditions provided by any enclosure as "completely natural"—especially not if it were so small that individuals collided when racing along the fence.)

Steiniger's rats soon began to attack one another and fought until all but one pair were killed. The descendants of that pair formed a clan, which subsequently slaughtered every strange rat introduced into the habitat.

DURING the same years that this study was being conducted, John B. Calhoun in Baltimore was also investigating the behaviour of rats. There were 15 rats in F. Steiniger's original population; 14 in Calhoun's—also strangers to one another. But Calhoun's enclosure was *16 times* larger than Steiniger's and more favourable in other ways: "harborages" were provided for rats pursued by hostile associates (such refuges would probably exist in the wild), and all Calhoun's rats were identified by distinctive markings.

For 27 months, from a tower in the centre of the large area, the movements of all the individual rats were recorded. After a few fights while getting acquainted, they separated into two clans, neither of which tried to eliminate the other. There was a good deal of crossing back and forth unchallenged—so often by some individuals that they were finally dubbed messengers.

Lorenz says that only the most aggressive creatures ever form permanent pairs, but beavers mate for life. And although their gnawing teeth would serve as very effective weapons, I have never known any occasion when they were so used against con-specifics. In their cleverly built houses, behind the dams and network of canals they have constructed, they live in notable harmony with one another and with the muskrats, for whom they provide ponds and who may be welcomed into beaver houses —as badgers will receive, and make friends with, coyotes and foxes.

How would such animals have *time* for continual fighting? What the absent biologists do not seem to realize is that a wilderness is a community of workers. Simply finding enough to eat every day is a chancy and tiring task.

It may be a surprise to know that many animals also spend a great deal of time keeping themselves clean and, if possible, free of parasites. Primates groom one another for hours every day. One year, one of the small pretty deer-mice came in to share my cabin, and sometimes I wished she would stop washing her fur; she did it so incessantly it was tiring to watch. (When I bathed, sponging water over

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Communications, Research, Machines, Inc.

XUM

Road to madness or road to reason?

myself from the basin in which I stood, she always took up a position in front of me and went through her own bathing routine.

Such mammals as these, in rising strata of complexity—these are our ancestors, more recent than the primitive, sexually antagonistic fish and geese. Many mammals have never even developed rituals to prevent the death of con-specifics, because they don't need them. Except when attacked by a predator, they quite simply do not fight.

Our immediate forebears, the apes, seem to have reached something like a summit in non-aggressiveness, since they do not fight either—not as individuals or as clans. Lorenz suggests that they do not attack their associates because they do not have such effective weapons as the teeth of wolves or the paws of lions, but would not the arm of a full-grown male gorilla be as strong as a lion's paw?

We do not know which mammals were the nearest ancestors of primates, but there are sufficient numbers of non-aggressive creatures living today to suggest that co-operation was becoming the habit of evolving mammals even before the primates developed. What, therefore, has happened? Man obviously is an aggressive animal. We have lost both the peacefulness and the inhibition against killing others of our own kind. Is there an explanation?

As Lorenz points out, aggressiveness can be taught. It is also intensified when it is exercised (and atrophies when it is not). When men began to settle in communities, they learned the irritations of being crowded. By then they had probably learned the use of weapons, originally for the purpose of killing game. And since they had already acquired at least a rudimentary speech, they could absorb from one another, and preach, animosity. With words, they could incite hatred against neighbouring tribes. A leader, coveting power or property, could, with propaganda, instill in his subjects admiration for warlike attitudes.

Perhaps that is the way—culturally rather than genetically—that human aggressiveness arose. As for sadism, something no animal displays, it is my belief that the trait is psychotic.

Nothing could more effectively prolong man's fighting behaviour than a belief that aggression is in our genes. An unwelcome cultural inheritance can be eradicated fairly quickly and easily, but the incentive to do it is lacking while people believe that aggression is innate and instinctive with us, as both Ardrey and Lorenz declare.

More than 100 years ago, the philosopher William Whewell wrote: "There is a mask of theory over the whole face of nature." Anyone writing about the wilderness has a great responsibility not to accept too readily a belief that the mask is nature's true face. In a chaotic and perfidious world, nature is all we have that is infallibly real.

If writers assert their own, unproven hypotheses as the truth, civilized people, so isolated from the wilderness that they cannot recognize a fallacy when they hear one, will be deprived of their one lifeline of what may be felt intuitively as sane and good. Then, even the intuition will be lost—what is there left for anybody but madness? ■

Left, how an American artist, Philip Kirkland, sees our aggressive society.

Below, how the young generation sees tomorrow's non-aggressive society.

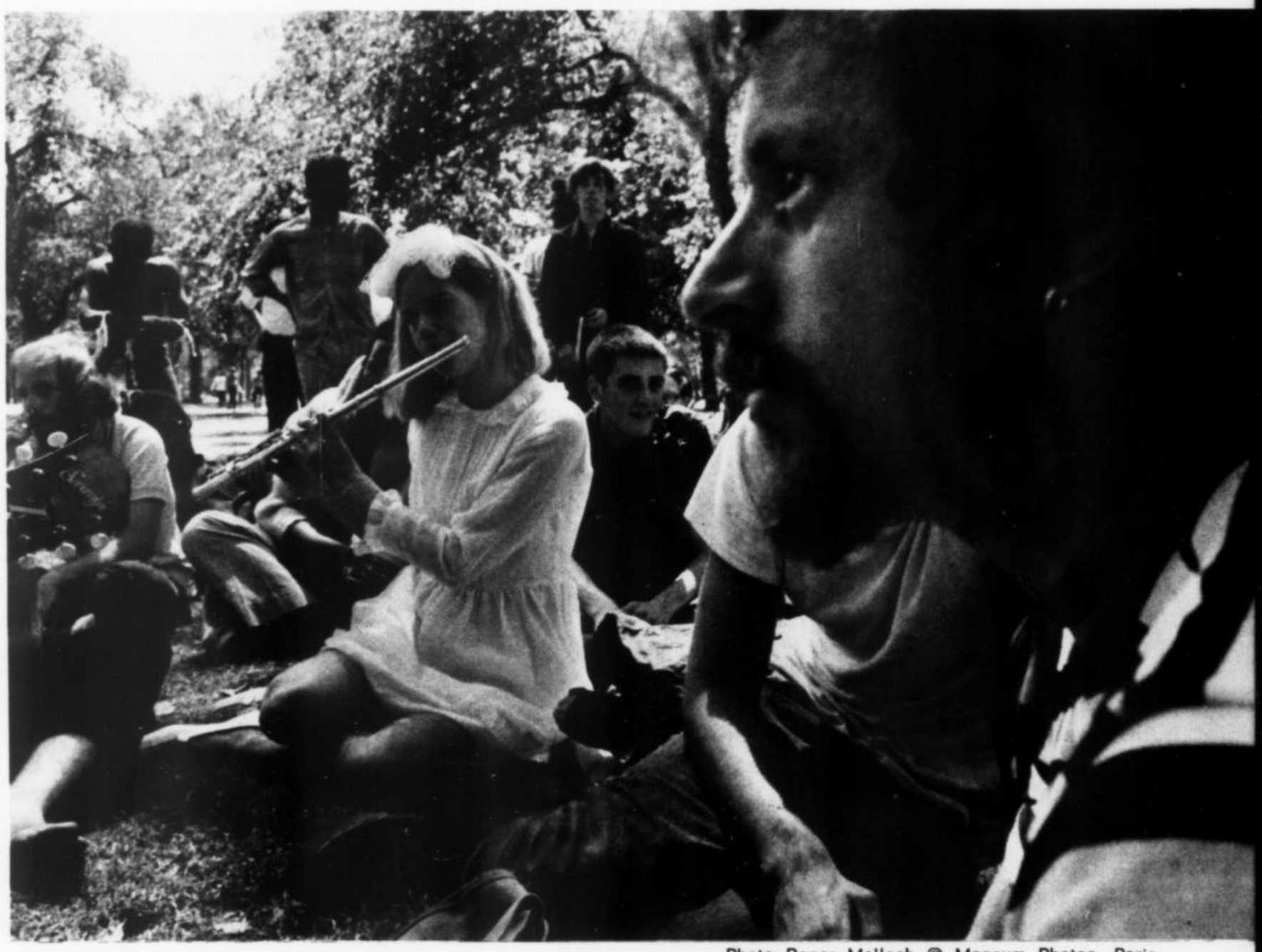

Photo Roger Malloch © Magnum Photos, Paris

MAN THE KILLER OF NATURE

by U Thant
Secretary-General of the United Nations

FOR most of the time that man has been on earth, his numbers have been small and his power limited. Damage to his environment was at worst local, and usually subject to repair by the regenerative powers of nature.

Only a few centuries ago, in 1600 A.D., human beings numbered an estimated 500 million, and much of the world was uninhabited or unaffected by man's activities. In the past few centuries, however, the world's population has increased sevenfold and all areas of the earth's surface have been to some degree modified by man.

With the prospect of another doubling of the world's population in less than half a century, the need to provide food, water, minerals, fuel and other necessities for such increasing numbers of people will place pressure on virtually all areas of the earth and demand the most careful planning and management of natural resources.

Accompanying the growth of populations in recent decades has been the spread of urbanization. Forty per cent of the world's people now live in urban areas. In somewhat more than half a century, if present trends continue, urbanization will have reached its maximum and the great majority of people will live in towns and cities.

The rate of urbanization is more rapid in the developing nations. In 1920, the urban population was 100 million in these countries. By the year 2000, it may well have increased twentyfold. In the developed nations, the urban population in the same period will have increased fourfold.

Urbanization is not in principle destructive to the environment. With proper planning and control, and if it were proceeding at a slower rate, it should enhance and not detract from environmental quality—by relieving pressure on rural lands, by providing goods and services in quantity and diversity, by providing new and attractive habitats and ways of life.

However, in most areas, governments have neither prepared for, nor have they been able to cope with, the mass migration into urban areas. In large cities, slums of the most wretched nature often become the environment of people who once lived in greater dignity and better health in the countryside.

Pollution of air, water, and land in urban areas have become universal problems. Diseases associated with urban living in developing nations have increased. Noise and congestion add to physical and mental distress.

Accompanying population growth and urbanization is the accelerated impact of industrialization, and of an advanced technology that is often poorly integrated with the needs of man and the environment. The production of crude petroleum was negligible a century ago. By 1966, however, it amounted to 1,641 million metric tons per year. Between 1937 and 1966, annual production increased sixfold. In the same period, the motor car, scarcely known at the start of this century, was produced at a rate that grew from 5 million to 19 million per year.

In the most recent decade, the total value of all industrial production has doubled. Industrialization is of vital importance to nations which seek to raise their living standards, but the side effects of poorly planned or uncontrolled industrialization and of the one-sided application of technology have been a direct cause of many serious environmental problems.

The reliance of modern technology upon the combustion of fossil fuels has brought a 10 per cent increase in atmospheric carbon dioxide over the past century. This could rise to 25 per cent by the year 2000. The consequences of such an increase upon world weather and climate are uncertain, but could eventually be catastrophic.

The increased use of modern technology has brought major increases in the amount of waste products which pollute the environment. In the United States alone, this amounts each year to 142 million tons of smoke and noxious fumes, 7 million automobiles, 20 million tons of paper, 48,000 million cans, 26,000 million bottles and jars, 3,000 million tons of waste rock and mill tailings and 50 million million gallons of hot water, along with a variety of other wastes.

Other industrialized nations make their comparable contributions of debris and toxic materials, and while technology is adequate to cope with these problems of pollution, the planning and application of pollution control lags far behind what is required, often because of the cost.

The spread of the urban-industrial network with its transport systems is consuming open space at a very high rate. In the United Kingdom, for instance, such expansion will consume one-sixth of the farming land in the next three decades. The spread of an urban-industrial-transport complex could enhance the human habitat, but too often uncontrolled urban sprawl destroys valuable resources, landscapes and living things.

EXPANDING populations bring increasing demands upon the productivity of agricultural lands for food and fibre. Application of technology to these lands has brought greatly increased production but it is vital that such gains should not be offset by damage to the environment. Increased use of fertilizers and new varieties of pesticides have raised food crop yields, but some of these agricultural chemicals have side effects on the environment that we are only beginning to comprehend.

The maintenance of both atmospheric oxygen and the productivity of marine environments, for example, depends on photosynthesis by marine plants, mostly the floating algae of microscopic size. Minute amounts of pesticides such as D.D.T. have been found to inhibit photosynthesis in these plants by 75 per cent. Yet we have dumped an estimated 1,000 million pounds of D.D.T. into our environment and are adding some 100 million pounds per year.

In the case of pesticides, world

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Photo © Y. Ivanov, Minsk, U.S.S.R.

This was once a thickly forested woodland in Europe. All the trees have been cleared and the swamps drained to make way for a modern industrial complex. Man is now capable of grandiose schemes of development where the economic and technical factors are all carefully worked out, but the long term impact on the environment is often overlooked.

Photo Cornell Capa © Magnum, Paris

48 **Turning his back on the garbage of our technological "civilization" this angler waits hopefully for a "bite". Soon this simple pleasure may be a thing of the past as industrial pollution poisons the world's inland waters. The once beautiful lakes of Switzerland are dying and pollution is affecting thousands of Finnish lakes. In North America it is estimated that it would cost over $40,000 million to clean up Lake Erie.**

production now exceeds 1,300 million pounds. The U.S.A. alone exports over 400 million pounds per year. Apart from their potential effects upon the productivity of the oceans, many of these pesticides are known to have harmful effects upon fish, wildlife and human health, which have been of serious consequence in many areas.

The land upon which man depends for his food has been seriously impaired by man's own misuse. Five hundred million hectares (1,235 million acres) of arable land have already been lost through erosion and salinization, two thirds of the world's forests have been lost to production and 150 kinds of birds and animals have become extinct because of man. Approximately 1,000 species or races of wild animals are now rare or in peril. Erosion, soil deterioration, deforestation, watershed damage and the destruction of animal and plant life continue and in some areas are increasing.

The environment of human settlements differs from all others in the degree to which it is created and controlled by man. It would be expected that man, being presumably rational, would at least have constructed for himself urban centres ideally suited to his occupancy. In fact, the opposite often appears to be true, and it is within cities that some of the most acute problems of the environment are found.

In most developing countries, it has rarely been possible to provide in advance the urban planning and design that would ensure a rational arrangement of space for living, working, transport and recreation, nor has it been possible to keep pace with the demands for housing, water supply, sewage disposal, education and the other amenities of urban life. Rapid urban development tends to overload every kind of public service, including transport and education.

The stress that often accompanies accelerated change results in emotional tension and a feeling of insecurity. These in turn may lead to mental breakdowns, psychosomatic illness, suicide attempts and an increase of crime, drug dependence and anti-social behaviour.

The deterioration of the physical environment, the natural as well as its man-made component, has social implications which can hardly be separated from the problem as a whole. Areas of natural beauty with an abundant wildlife within reach of urban areas have a social function of providing recreation facilities for city-

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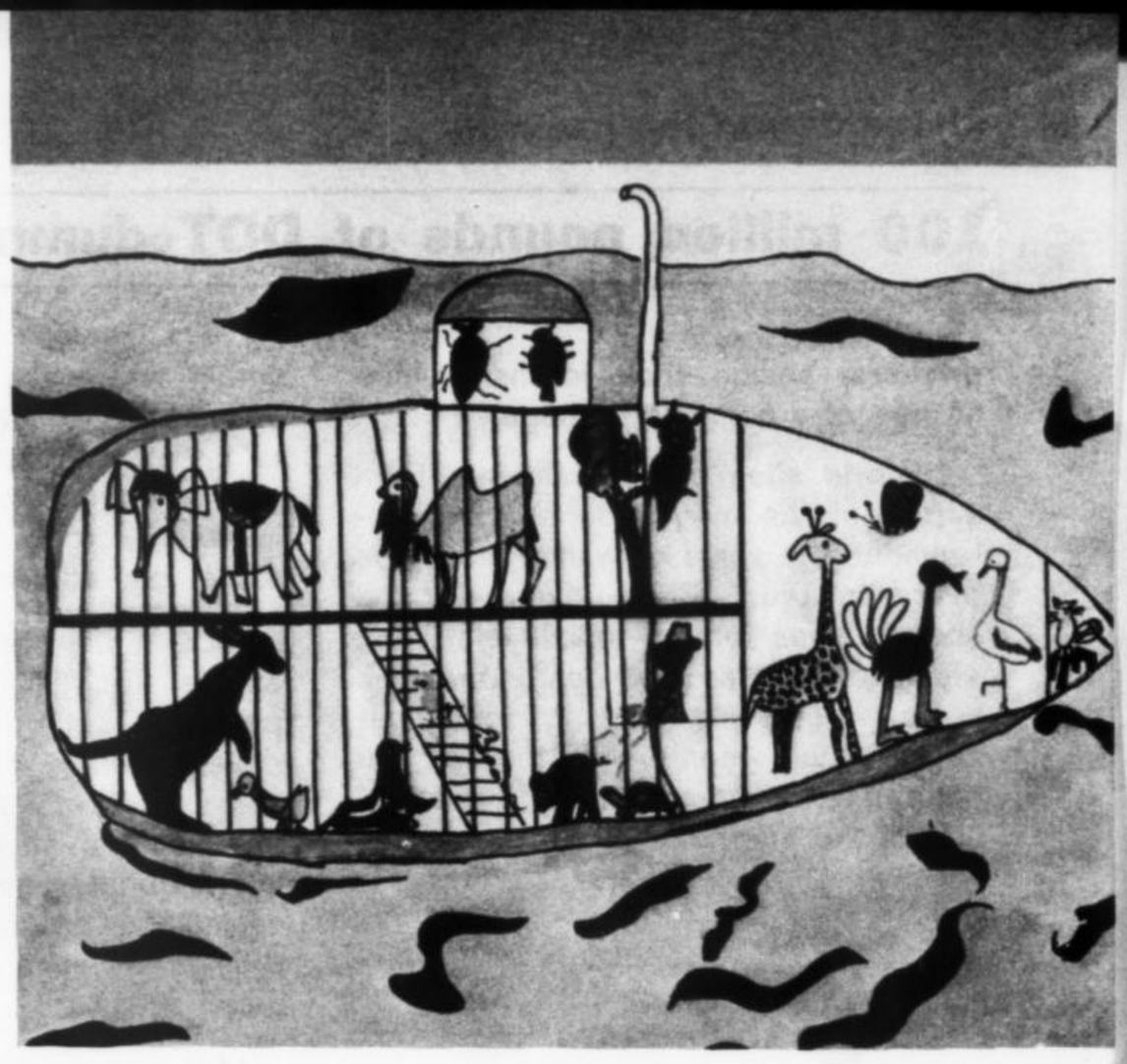
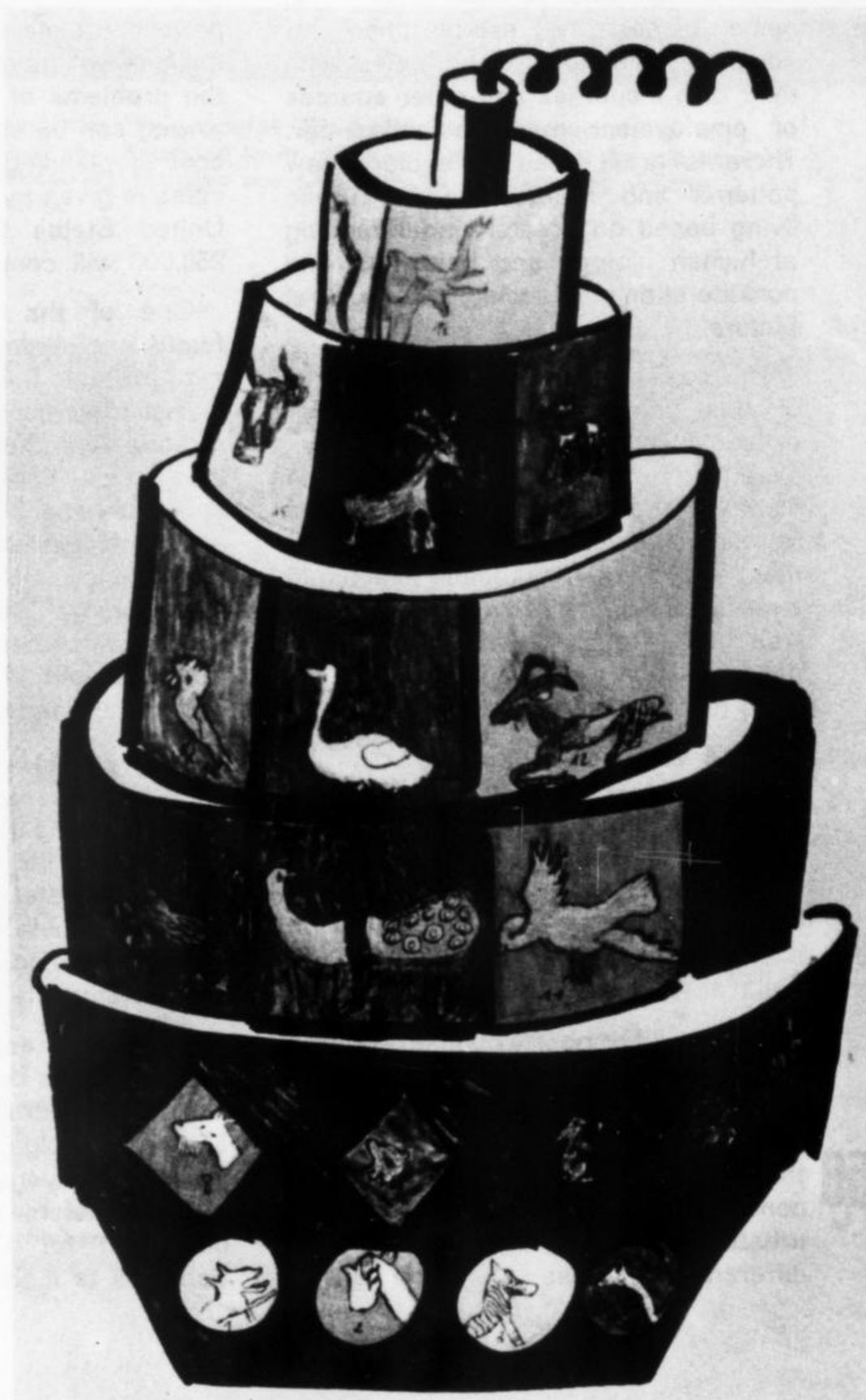
Photo P. Jones Griffiths © Magnum

Named European Conservation Year by the Council of Europe, 1970 has seen campaigns launched in many countries against man's abuse of nature and the increasing pollution of the environment. In France, "Operation Noah's Ark" mobilized young people for a nature protection campaign in which they formed teams to clear woodland, create small nature reserves and save wounded birds and animals. Right, two works from their exhibition of drawings and paintings on nature protection, held at Unesco, Paris in June. Above, on "Earth Day", April 22, 1970, gas-masked American students invaded the streets of New York to show their concern over pollution. Their warning—"you are the endangered species"—is timely, following a recent estimate that man is filling the air with more than 800 million tons of polluants per year.



OPERATION NOAH'S ARK

Photos Dominique Roger - Unesco



100 million pounds of DDT dumped into the environment each year

dwellers, beside their intrinsic value as part of a common heritage.

Historic sites and monuments form a part of the man-made human environment, the value of which cannot be overestimated. Their cultural and social values for the individuals living close to them as well as for mankind as a whole are evident, and their conservation, along with that of the natural environment, merits the attention of the international community.

THE magnitude of the problem in some developing nations appears to defy solution by anything less than a massive national and international effort. A first requirement is that of urban planning and design in which adequate consideration is given to the social needs of the population, including services. A second is for a major programme of construction and reconstruction. In some places the establishment of complete new towns and cities with their own industries and other sources of employment may be called for. There is great need to explore new patterns and frameworks for urban living based on greater understanding of human biology and behaviour and consideration of social and cultural factors.

The cost of such major programmes of planning and construction far exceeds any amount that has been expended on cities at any period in history. The need is for new facilities to accommodate urban populations that will have increased twentyfold over a period of only eighty years, from 1920 to 2000 A.D. The alternative to such a programme is accelerating human misery and mortality.

In developed regions the urban environment is afflicted with many of the same difficulties encountered in developing regions. Urban planning and design lag far behind urban growth. Where plans have been made they are often pushed aside by political, economic or social pressures.

Unplanned or poorly planned suburbs spread over the countryside surrounding formerly well-defined urban centres, merging indistinguishably with those spreading out from other centres. The result is an urban conurbation, a poorly defined and little differentiated mass of urban tissue within which the individual has difficulty identifying with a community and is beset with problems of transportation, congestion and pollution. It is impossible to describe such areas as cities, but only as urbanized regions.

Most developing nations lack specialists qualified to deal with the problems of urban planning and development. Educational programmes should thus be drawn up with this need in mind. In the meantime, international agencies and bilateral assistance programmes will need to provide technical and financial aid to these areas.

Many national and international programmes are under way, but all fall short of existing needs. Brazil has built an entire new city for its capital, but Brasilia is already plagued with urban slums. Pakistan has taken a lead in the planning and design of Islamabad, but its overall urban problems are incredibly complex.

Over $9 million are being provided to construct an experimental housing project in Lima, Peru, but hundreds of millions will need to be spent before the problems of the *barriadas* (shanty towns) can be solved. An idea of the cost of planning and building modern cities is given by the estimate from the United States that a new city for 250,000 will cost $1,000 million.

One of the striking demographic features of today is the rural exodus set off by the stagnant economic and cultural life of the villages in many regions and the magnet of the city. It is clearly impossible to provide the smallest villages with all the equipment and amenities of modern urban life. Nevertheless, if rural life can be made more attractive and living standards raised, fewer people will rush to the cities and more satisfactory patterns of land use can be developed.

Many problems have arisen from the large-scale construction of dams, reservoirs, canals, power stations and other works for the movement and control of water in major river basins or the transfer of water between basins to provide for power, irrigation, transport or city water supplies.

Such large scale development programmes have been carried out on the Nile, Niger, Volta, Colorado, Columbia, Missouri, Volga, Rhone, Indus and many other river systems. Major interbasin transfers of water have been discussed for Canada and Siberia. Schemes to modify the entire Amazon River basin and to open a sea-level canal across the Panama Isthmus are under consideration.

Economic and engineering factors are given full weight in most of these plans, but the broader impact on the environment is inadequately considered. Often little or no attention is given to proper management of lands in the watersheds developed by engineering techniques. Among the harmful effects that occur are silting up of reservoirs, loss of delta lands, salinization, spread of waterborne diseases and the displacement of peoples.

In the marine environment there is an obvious need, already considered by the United Nations, for international control over the exploitation of marine resources and a system for making rational use of these resources, which, in the absence of effective control and management, have been and continue to be destroyed or depleted.

The decline of certain species of whales and seals, of sea turtles, of the Pacific sardine and the Atlantic salmon fisheries, as well as the continuing over-exploitation of the Eastern Pacific anchoveta fishery are examples. The growing dependence of man upon the sea as a source of protein requires that its resources be properly managed.

POLLUTION of the sea is a continuing threat to its future productivity. Although the International Convention for the Prevention of Pollution of the Sea by Oil has been in existence since 1954, oil pollution is still a major hazard, and other forms of equally damaging pollution, over which little or no control is exercised, continue.

Research on the problems of the human environment is in progress in most industrialized countries. At the international level, such programmes as the International Geophysical Year, the International Biological Programme, the International Hydrological Decade, and the work of the Intergovernmental Oceanographic Commission have given a significant boost to research in important sectors of the environment.

Nevertheless, more emphasis has been placed so far on research in the physical and earth sciences than in the biological and social sciences, and even in the most industrially advanced

countries an ecological and integrated approach to research has rarely been followed.

Nor, as underlined by the Unesco Conference on the Resources of the Biosphere in 1968, is education at all levels and in all countries as yet designed to promote a proper understanding and appreciation of the nature of the problems of the environment. Only scattered efforts are being made in this respect in certain countries, mostly the developed ones, through an increased emphasis on ecology at the university level.

Very little educational material suited to the needs of developing countries is as yet available, although Unesco and the International Union for the Conservation of Nature are now working on the production of such material.

The training of specialists and technicians at all levels to handle problems of the environment is clearly a major need in the developing countries, where efforts are now being made to provide such instruction in national institutions. Similar education, appropriate to national conditions, is also given on a regional basis in institutions such as the Middle East Technical University at Ankara, the Training Centre for Sanitary Engineering in Morocco, the Turrialba Inter-American Institute for Agricultural Sciences in Costa Rica, or the Inter-American Housing and Planning Center at Bogota.

But all the efforts made thus far to house population, to integrate technology into complex environments, to plan and control industrialization and urban development and to manage land and resources effectively have fallen far short of global needs. Today, therefore, all nations face dangers of critical proportions that call for action at the local, regional, national and international levels.

There are so many problems that choices must be made and priorities established. It is to analyse these problems and to provide a focus for world action that the United Nations has called an international conference on the Problems of the Human Environment, which will meet in Stockholm in 1972. ■

This text is based on a study, "Problems of the Human Environment", presented to the U.N. Economic and Social Council in July 1969 by U Thant, Secretary-General of the United Nations.

Photo USIS

This curious beast, the "long-snouted fog-eater", is a tiny answer to fogs caused by polluted air. Extended to its full height of 100 feet, the plastic tube rotates in a vertical arc spraying out chemicals to disperse fog vapour over a limited area.

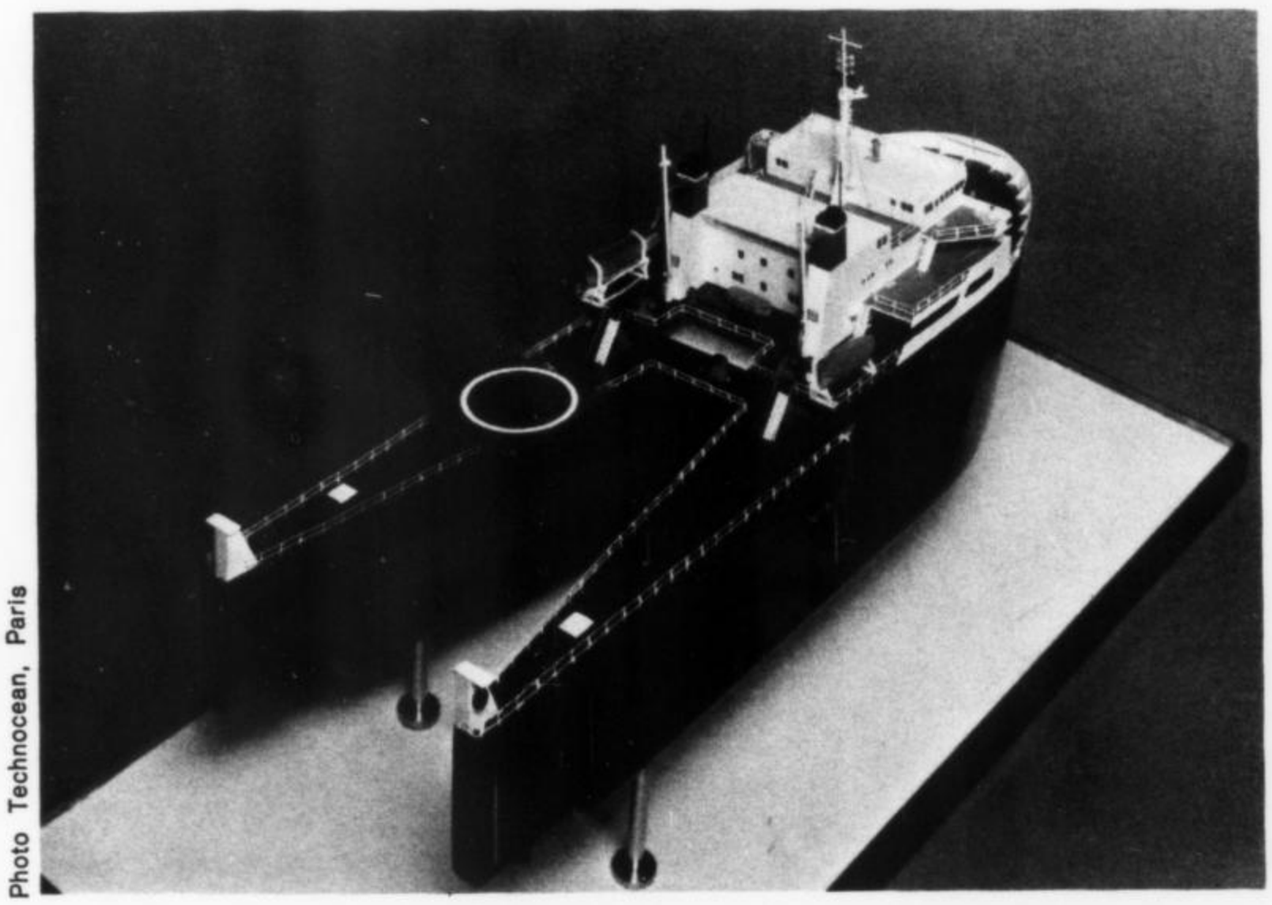


Photo Technocean, Paris

Designs for a floating "vacuum cleaner" that sucks up oil spilt on the ocean have been drawn up by the French Technocean Company. The rear twin hulls of the vessel produce a funnel effect and the oil and water mixture is sucked up through an intake valve at the V of the twin hulls. The mixture is filtered and the sea water jettisoned while the oil goes into the ship's storage tanks. The ship is designed to treat some 13,000 cubic feet of water per hour and to store the same volume of filtered oil.

Photo René Burri © Magnum Photos, Paris

The mansions and the shanty towns

It is just ten years since Brazil's capital was transferred from Rio de Janeiro to Brasilia, a skyscraper city built in five years on a desert plateau in the heart of the world's fifth largest country. Left, twin skyscrapers, serving as Congressional offices, rise above Brasilia's dome-shaped Senate building. Yet already Brasilia is plagued with its own "favellas", or urban slums, the outgrowth of a massive influx of people. Some of these immigrants camp where they can, (above) while others swell the population of new shanty towns, (below). The rush to the cities has created similar problems in all parts of the world.

Photos © Yves Billon, Le Raincy

Photo © Jacques Windenberger, Aix-en-Provence

All over the world tentacular cities are devouring the countryside. In the United States, nearly two hectares (five acres) of land are being consumed each minute by highways, urban expansion, airports, parking lots and similar space eaters. Existing towns merge to form sprawling "megalopoli" such as the one stretching from Boston to Washington or the area between San Francisco and Los Angeles. Above, axed trees mark the invasion route of an expanding Paris suburb. Above right, the massive shape of a modern housing complex rises above Genoa, Italy. A tiny tree, sole survivor of nature's green mantle, stands isolated in this new landscape of concrete forms.

THE CONCRETE CAGE

by Roelof Jan Benthem

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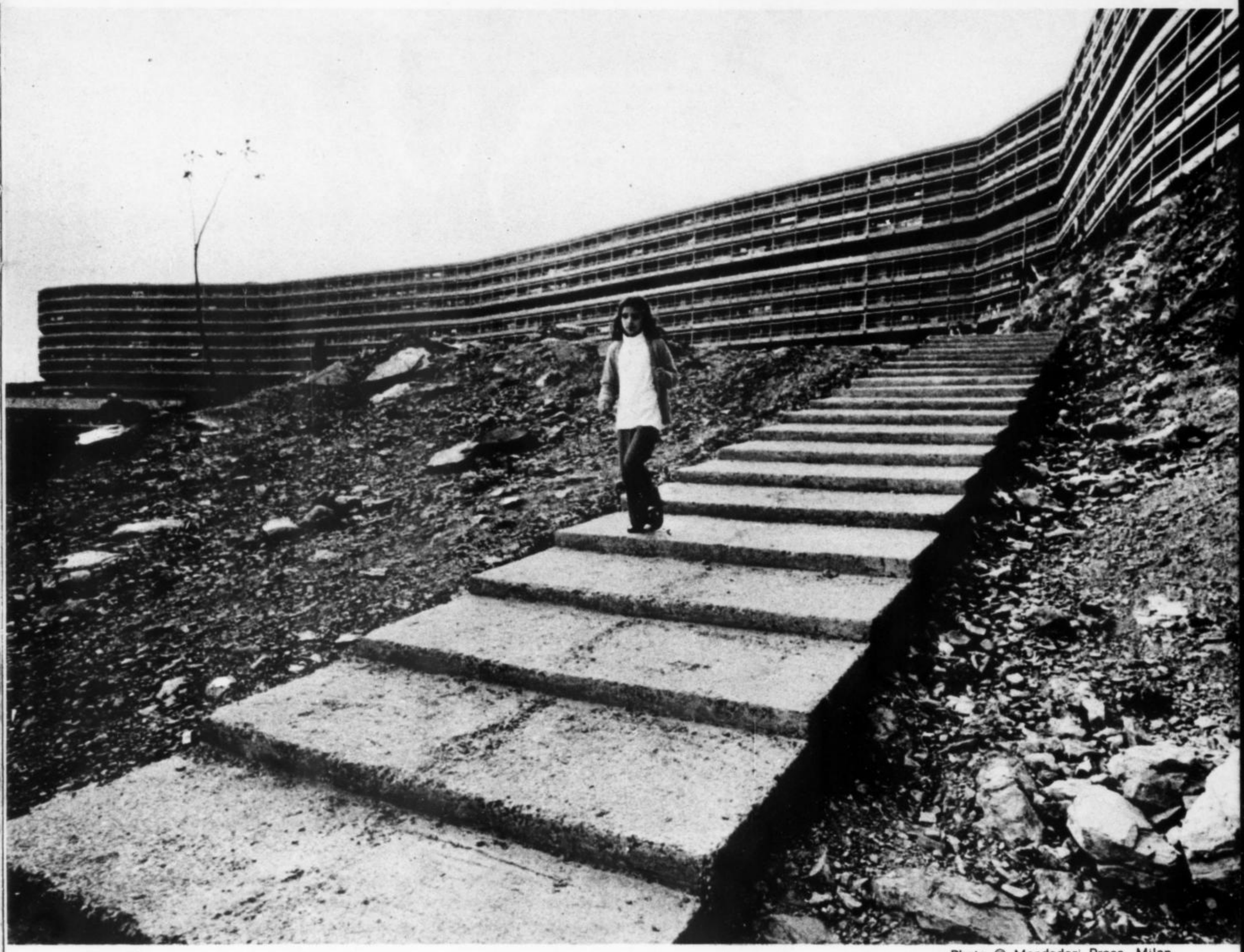

Photo © Mondadori Press, Milan

SINCE the early days of civilization, human settlements have illustrated the relationship of man to his natural environment. Sometimes there was a triumphant challenge in man's architecture, almost a collision with nature, as if man had tried to free himself from his surroundings, as demonstrated in the Greek and Roman cities. Other periods of history, however, show a deep attachment of former generations of builders to their natural surroundings. In the Byzantine cities and monasteries, for instance, in the same part of Europe, shape, colour and material combine to form a complete unity with the landscape.

Concentrated forms of settlement have been chosen in nearly all parts of the world where, in the evolution of mankind, farming became the fundamental structure of society. Our distant ancestors usually built their houses, villages and towns in compact units, in order to defend their dwellings against intruders.

Even nowadays this old pattern can be observed in different parts of Europe. Classic examples of this period are still to be found in a number of medieval walled cities which contrast with the surrounding open rural environment: Rothenburg in the Federal Republic of Germany, Trogir on the Dalmatian shore, Carcassonne in southern France and Avila in Spain, among others.

With the Renaissance the picture gradually changed. Wealthy citizens started to build their palaces and villas outside the towns, and integrated their dwellings into the surrounding countryside by creating parks and gardens. The villas outside Rome and, later, Versailles in France, Schwetzingen in

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Photo © United Press Photos, Paris

the Federal Republic of Germany, and Schönbrunn in Austria, still exemplify this period, in which the townsman began to discover the attractions of rural life.

In the dynamic process of man's growing control over the natural world, revolutionary changes have taken place since the last decades of the 19th century. With the beginning of the first industrial revolution, the striking contrast between the "stone city" and the "green country" began to give way, and the strict boundaries between the town and the countryside were no longer respected.

With unlimited and uncontrolled growth of urban development, dwellings and allied structures began to spread over the land. The mass movement of people from the countryside to the cities, the increasing expansion of industry and the rapid growth of population are the main causes.

Large tracts of beautiful landscape, evolved and shaped over centuries, often disappeared in a few years as a result of unbridled urban explosion and a total lack of regional planning policy.

Since World War II, a new awareness of the values of the environment has arisen. Unforeseen progress in technical development has completely changed the pattern of human society, and the reconstruction and expansion of urban zones has become one of the features of post-war government policies.

Much research and many experiments in the development of new forms and policies of urban planning have been carried out during the last decade. Instead of the old pattern of concentrated towns, new ideas have been launched and realized.

The chilling prospects of the "Megalopolis" cleared the way for an encouraging search for urban systems more in keeping with man's needs and human dignity. Linear towns, city regions with open space systems, satellite-town developments and the "garden city" concept of the English town planner, Sir Ebenezer Howard, have been tested more or less successfully in several countries.

The concentration of people in ever greater agglomerations is one cause of the difficult situation that has arisen in parts of Europe and elsewhere in the world, and the migration from the countryside to the big cities continues in many countries.

In France, for instance, no fewer than 150,000 persons employed on the land move to the cities every year. As a result, the population of the towns, large and small, will have doubled by 1985. By then, more than four-fifths of the population will be concentrated in towns. Almost 60 per cent of today's Parisians were born in the country.

There has been a relative depopulation of the heart of France's big cities, but at the same time an increase in "suburbanisation." Between 1954 and 1962, the community of Paris lost 24 per cent of its population through migration, but the population of the Paris urban district increased by 30 per cent and that of the suburban district by 65 per cent.

In the densely populated western part of the Netherlands, the "Randstad Holland," as it is known, where an intensive "conurbation" (a continuous

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The elephants, left, are not wearing ear muffs as a gag. Muffs were fitted after elephants, newly arrived from the jungles of Thailand, stampeded and escaped when a low flying jet passed over the zoo, located near London airport. From the moment they leave home, city workers, below, are exposed to a constant barrage of noise from trains, road traffic, office machines, factory equipment, to name but a few sources. Researchers looking into the relationship between noise ond health report that when a sudden noise strikes the ear, the heart beat increases, blood vessels constrict, eye pupils dilate and internal organs are seized by spasms. One scientist predicts that if noise continues to increase for the next 30 years as it has for the past 30, it could become lethal.

Photo © Jacques Windenberger, Aix-en-Provence

network of urban communities) has evolved, nearly one half of the population of the Netherlands is living in a region which covers no more than two-ninths of the total area of the country.

In the Ruhr area of the Fed. Rep. of Germany and in the industrial centres of Belgium, Italy and the United Kingdom, similar situations clearly demonstrate the effects of a concentrated urban structure.

In Europe, as in other parts of the world, the impact of an enormous suburban sprawl on the surrounding countryside is clearly apparent. Describing these suburbia, a Council of Europe report notes the existence of "individual houses, small, mediocre and monotonous, surrounded by tiny garden plots which are the only outlet for the personal taste of each owner, expressed in the arrangement of his kitchen garden, his patch of lawn, his few yards of fence, with the result that these dreary plots combine the worst features of uniformity and diversity alike.

"The final decline of the area resulting from this nondescript concentration of separate houses is difficult to prevent," says the report, "precisely because this type of housing satisfies the desires of the majority of the population. In France, for instance, an enquiry showed that 82 per cent of the people prefer small houses to flats, and the attachment to a small garden may well be attributed to the resurgence of a former peasant background which, in a population only recently urbanized, is never far distant."

In the United Kingdom, over 40 per cent of the population live within six vast urban concentrations. But this country, the cradle of the "garden city", has evolved new urban forms to meet changing conditions and new ways of life. In the last 20 years, extensive public building programmes have raised 14 new towns, now completed, and 14 more are being built.

Based on this experience, new insights and new techniques have developed rapidly in the United Kingdom. Considerable attention has been given to methods of studying the social, economic and physical factors in new town planning and how to use this new knowledge.

Britain's first new towns were built soon after the end of the Second World War on sites containing relatively small centres of population in the vicinity of an urban agglomeration. The population target was usually fixed at between 50,000 and 80,000. Many of the towns chosen for expansion in more recent years are already important centres in their own right and have thus been able to build on the basis of a large existing population and an established industry. The maximum scale of expansion—that of the new town at Milton Keynes—provides for a population of 250,000 in an area of nearly 22,000 acres.

Earlier new towns were set up as satellites in a ring about 20 to 30 miles from the conurbation centre. More recent new towns and major town expansion projects tend to be sited much farther away.

The recent new towns are visually more sophisticated. Densities of construction are higher, but provide a

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Invigorating the classic landscape

greater variety of accommodation. The neighbourhood is no longer considered as a distinct and separate physical entity.

In each new town the landscape character of the site has been fixed at the start of the planning process, as a guide in the location of all the land uses. The design of each town respects throughout the character of the landscape and its potentialities, a policy which has proved of special value in the later towns, incorporating more distinctly urban concepts.

Town planners in England now have in mind towns of 300,000 to 500,000 inhabitants, not located within an area generally covered by local traffic. These urban clusters would no longer be satellites arranged around a nucleus, but new independent focal points.

In France, the "départements" of the provinces have relatively small scope for activity in the field of economic development. Paris, the focal point, wields a tremendous influence. But plans are now being studied in France to transform eight existing towns—at some distance from Paris—into secondary metropolitan cities with up to one million inhabitants.

In the Federal Republic of Germany, urbanization has from the start developed in a decentralized form due to the spatial structure and the historical development of the country.

URBANIZATION in its present form has a much greater influence on the environment than ever before. This is partly due to the scale of urban development and partly as a consequence of the stronger relationship between the urban and the rural worlds. Communication between the different urban concentrations increasingly opens up the countryside. Greater land use and increasing exploitation of natural resources are also directly related to the urban process.

There is a distinct connexion between a particular type of urban development and its effects on the countryside. Much depends on the attitude of man and his ability to create and handle efficient planning machinery.

In nearly all European countries the existing landscape pattern is strongly influenced by man's activities. Some parts are even completely man-made. Nevertheless, a great diversity has been created and maintained during centuries of development. It is even probable that the cultural landscape of Europe is more varied than the original natural scene which existed before man transformed it.

This diversity is threatened by the urban expansion of the last century and particularly of the last few decades. Firstly, the spreading urban area itself encroaches on the available land. This increase is not only caused by population growth but also by rising standards of living. The basic features of life demand far more space today than at the start of the century.

The most spectacular effects of urbanization on the environment can be seen in a zone of varying width lying between the frontier of the urban region and the surrounding countryside. In this transition zone—a kind of "no man's land"—the town has not fully established itself, but the genuine rural land has already disappeared. Characteristic features of this zone are decaying farms, junkyards, roads and railways, electric power lines, airfields and petrol stations—and the ever-present publicity hoarding.

Townsfolk and country people are concerned with what is going to happen in these transition zones on the fringes of urban conurbations, but the problem has not yet been sufficiently understood and studied. A joint approach by scientists, planners and designers is urgently needed in these areas to safeguard the interests of both town and country.

Increased prosperity, better transport and more leisure have led to a resurge of interest in outdoor life. Living conditions in many urban areas stimulate the desire of the townsman to find relaxation in the countryside during leisure time. Hence the increase of second homes in many European countries.

The results of this offshoot of urbanization need not be harmful to the landscape providing such factors as regional and landscape planning and protection of the environment are taken into account. In parts of Western Europe, good use has been made of old abandoned farm houses which have begun new lives as second homes, and whose restoration, in many cases, has made them attractive examples of rural architecture and undoubted assets to the landscape.

On the other hand, there are examples, particularly in coastal areas or other attractive scenic regions, where second homes, week-end retreats or holiday settlements have become liabilities to the landscape because no adequate planning and building control exists.

THE time has perhaps come to consider the possibilities for a planned development of urban and rural areas on a much broader international scale. National planning should at least consider and be based on a framework for development of "international regions" that could embrace central, western and southern European countries.

Such an approach is urgently needed. The interdependence of European nations in several spheres of land use is more and more evident. Growing awareness of the implications of regional planning problems in all countries and their increasing European significance has led in recent years to the setting up of regional co-operation groups in trans-frontier areas.

The expansion of international tourism means that an ever greater number of people are visiting beauty spots and recreation areas in different countries. The increasing use of roads, railways and other means of communication creates an obvious need for international consultation on the management of these areas.

In an age when space exploration and moon landings have become a reality, it should be possible to develop a proper management of man's home here on earth. Urban development need not necessarily be destructive to the countryside, but should be one of the components of a comprehensive policy for reconstruction and rehabilitation of the environment. ■

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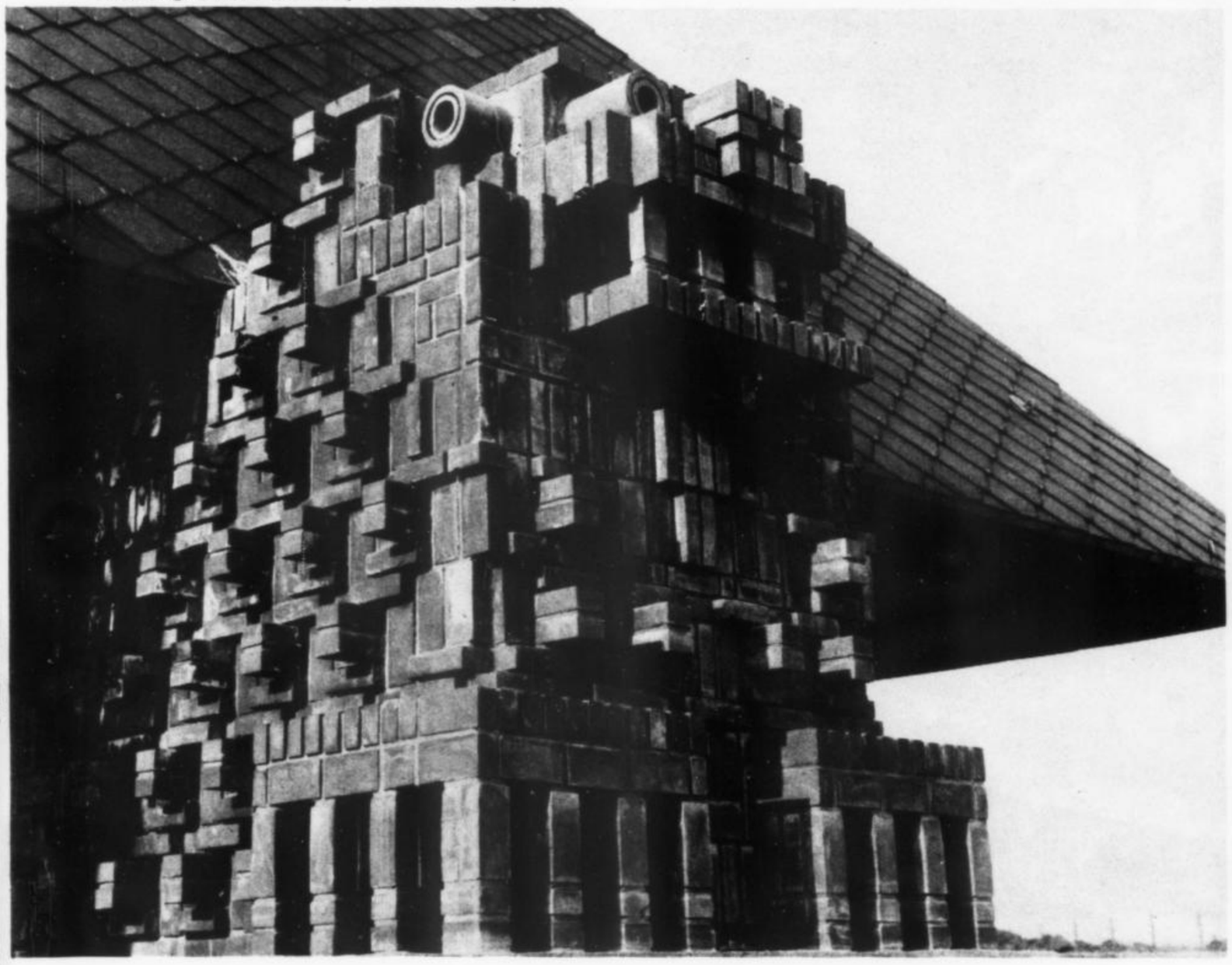

HOT WATER PYRAMID

At first glance, this building, above, looks like an Egyptian pyramid. But for its French designer it is a purely geometrical form that harmonizes with other buildings in the new town of Mons en Barœul, near Lille, France. A pyramid-shaped building is in fact an appropriate choice for the area. To the 30,000 inhabitants of the new town it has the familiar outline of the coal tips that dot the landscape in this coal mining area of northern France. A dominating feature of the new urban centre, the pyramid has also a utilitarian purpose. It houses an ultra-modern plant, supplying heat and hot water to the entire town. Within the pyramid, chimneys from three oil-fired furnaces lead to a single outlet in the apex. Special equipment filters off smuts and oily smoke to prevent air pollution. Left, close-up of one of the 12 brick figures («guardians of the fire") which support the slate covered structure. The appearance of these figures—stylized forms of the ancient heraldic Lion of Flanders — is strikingly similar to the monumental sculptures of Mayan temples of Mexico.

Photo © The Press Association Ltd., London

XUM

Growing to miraculous life amidst the flotsam of a great port, this sunflower brings a moment's pleasure to a passing sailor. In the industrialized countries, oil-fouled rivers, streams and estuaries often serve as sewers and rubbish tips. Fish and vegetation no longer thrive in rivers whose natural course has been modified to provide hydro-electric power. In Sweden, the government has decided to maintain the river Vindelalven in its natural state so that future generations will be able to marvel at the beauty of at least one river undefiled by man.

Industrial Europe faces the challenge of pollution

by Roberto Passino

THE effects of industry on the environment vary considerably from one country to another.

Countries which have long been extensively industrialized have already been able to see for themselves the bad effects of the growth of industry on the environment and are consequently seeking remedies for them.

Countries where industrialization has come fairly recently merely emphasize the good aspects of the process, and deliberately play down the ill-effects because they are not very noticeable.

Countries which are in the process of becoming industrialized make great play of the good factors of technological development and almost ignore the unfavourable side.

This is the varied picture for Europe that emerges from reports to the Council of Europe from member states for a special study on "Industry and the Environment." The study was examined at the European Conservation Conference convened by the Council of Europe in Strasbourg, earlier this year.

The situation is relatively satisfactory in countries with low population density and limited urban and industrial development such as Cyprus, Malta, Ireland and Finland; it is less satisfactory in certain areas of Switzerland and Italy; it is critical in France, England, Germany and Belgium which have long been industrialized.

In England, measures have been taken to reduce pollution and damage to the environment. The results are encouraging. The construction of new electricity power stations, gasometers and refineries and their attendant networks of overhead power lines and pipelines is closely controlled by committees of specialists whose task is to preserve the beauty of the countryside.

Special bodies are responsible for the control of mining areas and the rehabilitation of regions containing worked out pits, the prevention and control of coastal pollution by crude oil, and the supervision of road, rail and air route development. Specialized research laboratories are studying air, water and soil pollution and the problem of noise levels and are working out suitable countermeasures.

The Federal Republic of Germany reports that efforts to combat pollution have been intensified since 1960. Water purification stations have been built and it has been made compulsory to fit filters to reduce air pollution by dust. So far, however, there is no equipment for the elimination of sulphur dioxide. About 130,000 acres of forest are affected annually by these gases causing losses amounting to 21 million DM a year. Laws have been passed to reduce noise.

In Belgium, where industry was at first concentrated in the south but is now spreading to the rest of the country, the environment is exposed to serious damage and the situation is becoming worse. Laws and decrees dealing with the problem already exist, but further legislation is needed.

The number of factories in Switzerland, mainly in the textile and chemical industries, has quadrupled since 1900 with a resulting increase in noise and air and water pollution. Most Swiss lakes are heavily polluted. The situation of Lake Constance, for example, is alarming. Since 1950 the phosphate content of the lake has increased almost tenfold and plankton thirtyfold. Attempts are being made at federal, regional and local levels to find new ways of preventing this pollution.

In Finland, industrialization is confined to the south where the population density is also greatest. Contrary to what might be supposed, Finland has a poor supply of drinking water, because many lakes are shallow and are rapidly becoming asphyxiated as a result of the discharge of domestic and industrial waste. Already 10 to 15 per cent of the country's inland waters are polluted. Helsinki's drinking water has to be brought from a lake 160 miles away. Air pollution, however, is slight even in the largest centres.

There are laws on the subject and experimental centres have been set up for the elimination of all types of polluting agents. Considerable damage is, however, caused by some industries whose effluents contain highly toxic substances such as chlorinated hydrocarbons, mercury derivatives, etc., and measures have been taken to eliminate these factors. The use of D.D.T. has been banned from this year.

The situation is quite different in Malta where the government is attempting to combat unemployment by the introduction of new industries. As a result, noise and air and water pollution are increasing and good land is being lost to farming. A shipyard

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ROBERTO PASSINO *is Director of the Institute of Hydrological Research of the National Research Council, Rome. He participated in a conference in February this year on European conservation problems, convened by the Council of Europe, at which he presented a paper on "The Effects of Industrialization on the Environment". The above article is condensed from this study.*

is polluting the atmosphere in the densely populated area of Conspicua, Senglea and Vittoriosa with serious danger to public health. Sea water is polluted by the discharge of large amounts of waste matter by coastal industries. There are no laws for the protection of nature.

Cyprus too is faced with increased industrial activity promoted by the government's five year plans. The industries concerned are mostly connected with agriculture and use electric power. Nevertheless, there is a danger of pollution from the mining of asbestos, copper and pyrite. There are also oil refineries and gasworks that mainly pollute the sea and have a harmful effect on the development of the tourist industry.

As a result of its special geographical situation, decentralization in Austria has brought its own problems. The small valleys are often the most seriously affected. Fumes, dust, noise and smells constitute a real threat to the environment. Although some regional laws have been passed to protect nature, there is no appropriate national legislation.

The Greek industrial areas of Athens, Salonika and Patrasso already show symptoms of acute contamination. The coastal region near Athens, for example, is seriously threatened.

In Sweden, the problem of man's impact on nature has been appreciated for a long time. Since the end of the last century scientists and technicians have been concerned with the study of ecology, of contamination and its elimination. Using the results of this research and by suitable legislation, many of the problems of the contamination of the environment have been solved.

Atmospheric pollution is a negligible problem in Iceland where power is normally provided by electricity or geothermic vapour which is readily available in this volcanic island. The fish-packing and fish oil industries create problems due to fumes and odours, but natural meteorological conditions and winds help to offset these effects. Water pollution is mostly thermal and laws exist which forbid the discharge of water at temperatures exceeding 30 to 35 degrees centigrade.

Water pollution is the chief problem in the Netherlands and here an international aspect is involved. In fact, 70 per cent of the water in the Dutch river network comes from other countries and is thus already heavily polluted. The waters of the Rhine, for example, now show such an increase in chlorides that they are unsuitable for desalting the polders. These

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Use or abuse?

Every year, 48,000 million cans, 28,000 million bottles, 100 million tyres and 7 million cars are discarded in the United States alone. Right, like some malignant idol, this rusting hulk stares blankly out from one of the many car cemeteries that litter the countryside of the industrialized world. Occasionally the skeletal remains of bicycles, above, serve on as makeshift barriers, and unwanted car bodies are submerged off our coasts, acting as artificial reefs that attract lobsters and other marine life within easy reach of the fisherman, below.

Photos Philippe Bertot © Atlas Photo, Paris

Photo © G. Feinstein, Paris

Photo © Roger Canessa, Toulon

chlorides are of mineral origin and are dumped into the river in the coal mining areas of the Ruhr, Emscher and Lippe where saline water is pumped from the mines.

In Italy industry is concentrated in certain regions and, like the urban areas, is developing chaotically since there is virtually no planning in this field. Household and industrial liquid waste is dumped into waters without any purifying treatment. As a result streams, rivers, lakes and coastline, and the environment in general, have deteriorated rapidly. In the whole of Italy there are only thirty-two purification plants—one plant for every thousand communities—and these are mostly too small to be effective. Motor traffic and domestic and industrial smoke contribute to the production of smog in certain areas.

The deterioration of the environment concerns everybody. Its prevention requires the arousing of public opinion and the active participation of all citizens as well as co-operation at the international level.

Economic incentives can be used to protect the environment. Tax benefits could, for instance, be granted to industry for the construction of waste treatment plant. Similarly, heavy fines could be levied on those industries which discharge untreated waste liable to pollute the environment.

In any case, governments must harmonize economic measures so asto place industry in all countries on an equitable competitive basis.

The true solution lies, above all, in prevention. It would be desirable, for example, in every allocation of funds for new industrial construction, to require part of the capital (2 to 3 per cent) to be set aside for conservation of the environment.

Pollution is part of the price we pay for our modern society. Nobody knows its total cost because it is spread over the whole social structure and has never been examined in isolation. The damage to health, both physical and mental, to plant and animal life, to the aesthetic qualities of our natural surroundings, to the artistic value of buildings and objects, cannot readily be estimated.

We shall soon have to face the problem of finding room for the waste products that result from the bad management of our technological society because they are about to submerge us. In our effort to improve living conditions it will certainly be more economical to use preventative methods from the outset rather than look for ways of cleaning up the environment when pollution is already widespread. ■

'WOODMAN, SPARE THAT TREE.' Since the Middle Ages entire forests have been destroyed in Europe to satisfy an insatiable demand for timber and to obtain land for farming or pasture. In 1962, the world market needed 1,000 million cubic metres of wood. By 1985 this figure will have doubled. But by that date wood production, if kept within non-destructive limits, will be only 1,000 million cubic metres. Trees and vegetation protect the soil and regulate the flow of water. In Italy, where forests have been destroyed over the centuries, erosion has caused tremendous damage. The river Arno, for example, carries twenty-six million quintals of earth to the sea every year. The catastrophic floods of November 1966 which devastated northern Italy and destroyed many of Florence's priceless art treasures (see the Unesco Courier, January 1967) brought vividly home the dangers of unplanned deforestation. Experts estimate that 8.6 million acres of land need replanting with trees in Italy to prevent the recurrence of such disasters. It has been shown that the flood risks are 30 to 50 per cent less in completely wooded areas than in areas where only one third of the land is wooded. Erosion of soil resulting from deforestation in turn affects plant life. In the Swiss canton of Argovia alone nearly 400 species of plant have disappeared since the beginning of the 19th century.

XUM

'THE YEAR OF THE WHALE'

by Howard Brabyn

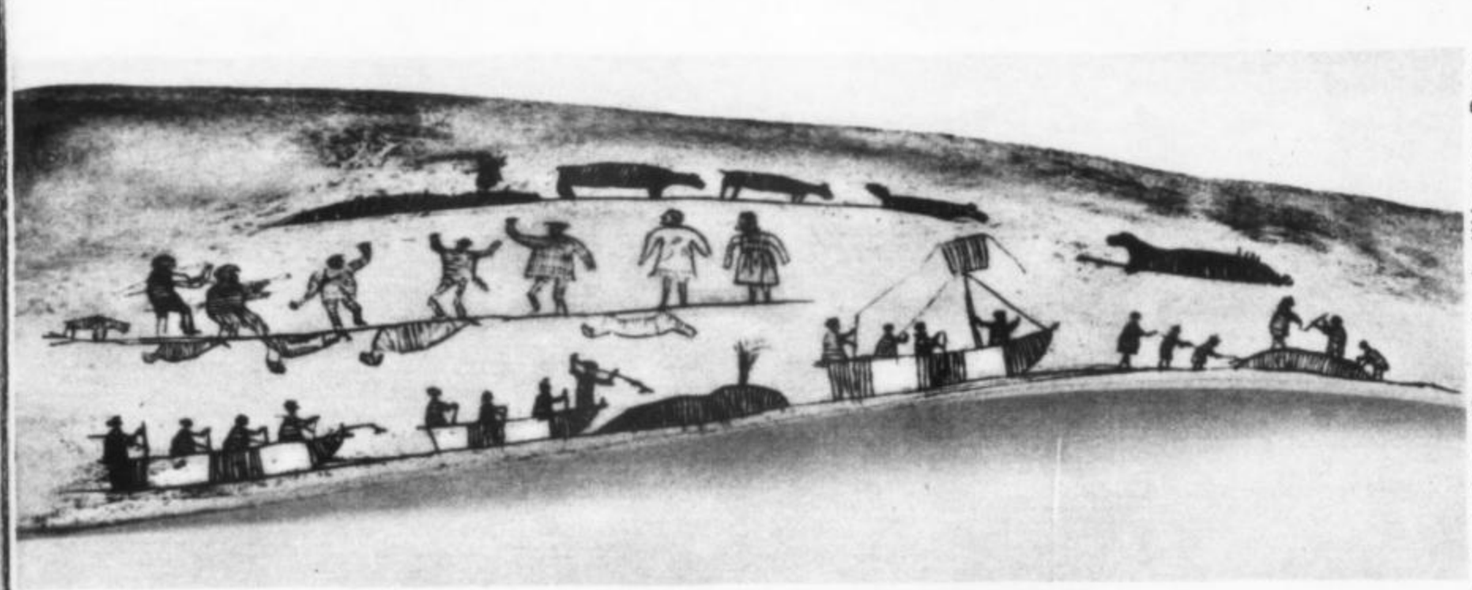
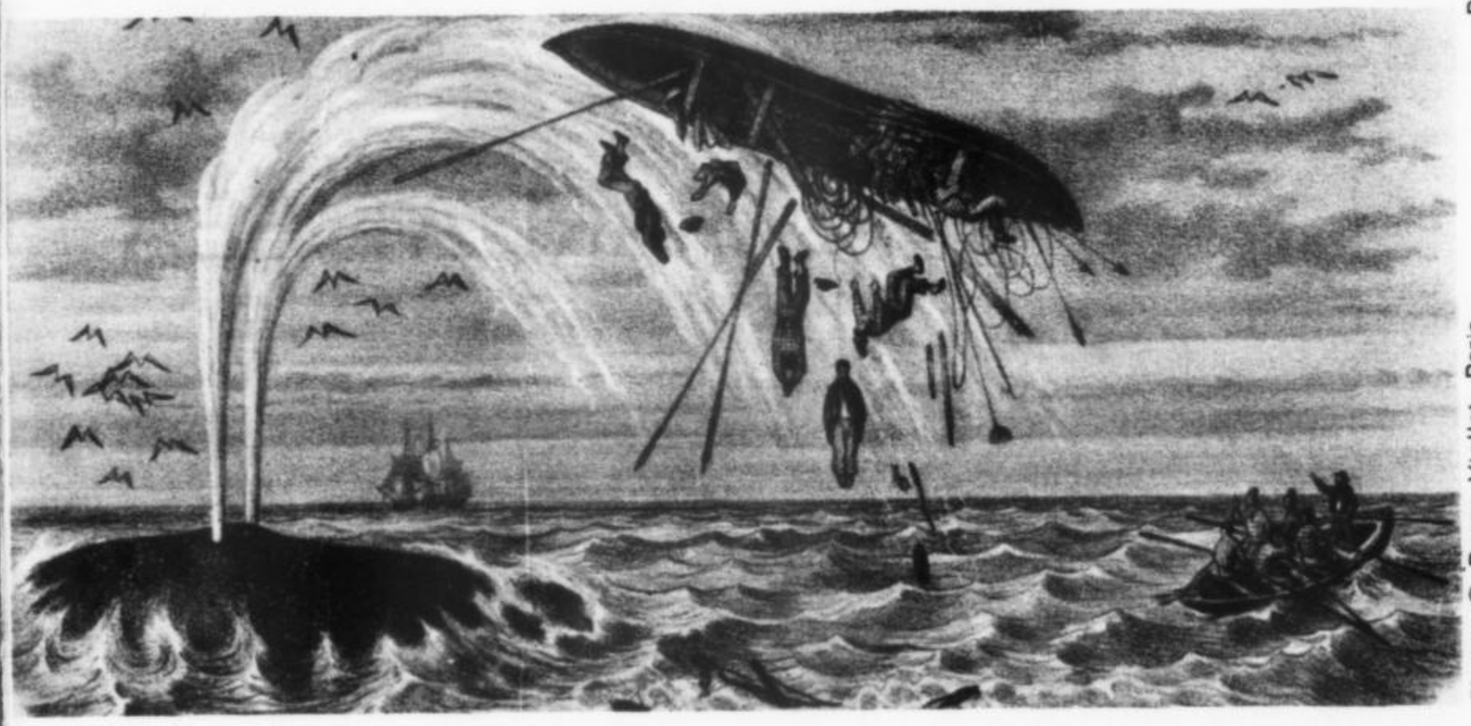


Photo José Oster © Musée de l'Homme, Paris



Photos © Roger Viollet, Paris

THE moot point is whether Leviathan can long endure so wide a chase and so remarkable a havoc; whether he must not at last be exterminated from the waters, and the last whale, like the last man, smoke his last pipe and then himself evaporate in the final puff."

These prophetic words of Herman Melville, the author of "Moby Dick" and himself an experienced harpoonist, strike home uncomfortably in a decade which may see the final extinction of the blue whale, the largest mammal ever to inhabit this world.

In thirty years the total blue whale population of the world's oceans has dropped from 100,000 to 1,000. Four other species of whale are now being caught at a rate faster than they can reproduce.

This is but one more example of man's incredible failure to respect the ecological system of which he is a part and his wanton destruction of the world's natural assets that have served him so well in the past.

We have only to consider the products that man derives from whales to realize how misguided it is to permit the overfishing of these valuable beasts. For centuries whale oil lit men's homes, whale meat provided an

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Top left, this Alaskan Eskimo carving on the jawbone of a Beluga whale depicts the events of a successful whaling expedition and the subsequent dance of rejoicing. Centre, in the early days of whaling, men pitted themselves against these leviathans, operating from cockleshell boats and armed only with hand harpoons. It was a perilous life calling for strength, courage and seamanship of a high order. Bottom left, despite their proud posturing these men seem puny and insignificant beside this 50ft monster, majestic even in death.

SAFARI AT SEA

Photos Terence Spencer © Parimage (CP), Paris

The pith helmet and bush jacket of the rich, dilettante big-game hunter have been replaced by the sea-boots and oilskins of the millionaire who wants to boast about the size of the whale he caught and the even bigger one that got away. Already threatened with extinction by the legitimate whaling industry, the world's largest creatures now have to contend with the "kill for a thrill" brigade. Above, a "sportsman" administers the coup de grâce to a sperm whale off the Azores. Left, boatmen ship oars to pull alongside the dying quarry. Right, the modern version of the arrogant hunter's pose with his trophy.

XUM

Certain species on the road to extinction

important source of food, and whalebone, inserted in women's corsets, moulded women's figures to conform to the dictates of fashion.

In more modern times whale oil is used in the quenching and rolling of steel, as an extreme pressure lubricant, for the dressing of leather, in the manufacture of soap and candles; whale meat meal is used for cattle cake and poultry food, frozen whalemeat is widely eaten by humans, especially in Japan; bone meal and guano, meat extracts and liver oil rich in vitamin A are other by-products; ambergis is still of importance in perfumery and whalebone is still used for corsets and for bristles on industrial brushes.

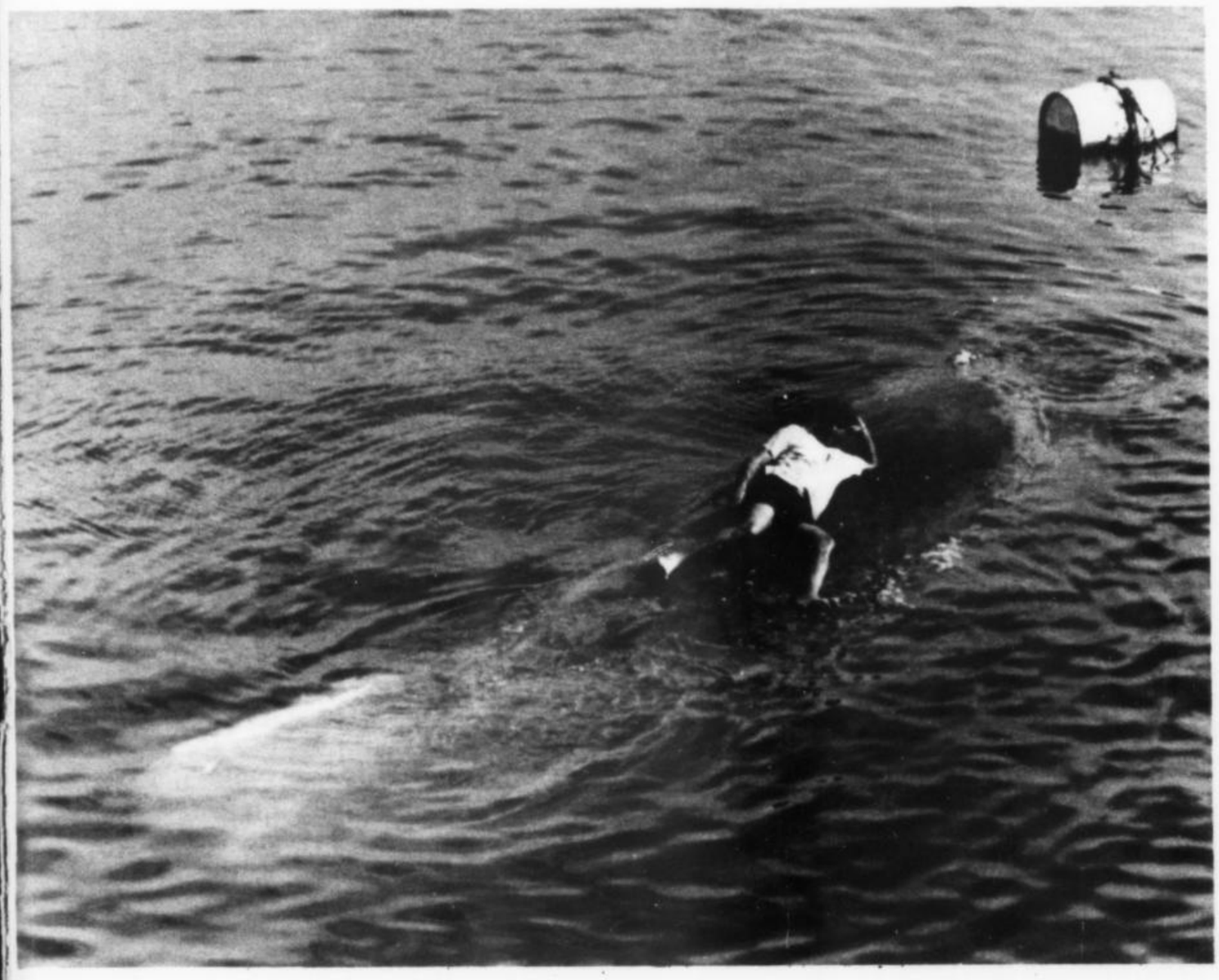
The vast size of whales (a blue whale can measure up to 100 ft in length and weigh as much as 176 tons or roughly the equivalent of 2,000 men) has always aroused human curiosity and given rise to a wealth of legends from the adventures of Jonah in the Bible to Herman Melville's Moby Dick. Writers from classical times, such as Aristotle and Pliny, wrote of the smaller whales, the dolphins, who were considered to be the friends of man, and there are many tales of tame dolphins who carried boys upon their backs. Among Spanish and Portuguese fishermen there is a persistent belief that dolphins attack sharks and drive them away.

Stone Age man probably hunted the smaller whales and dolphins. Eskimos and American Indians are known to have gone whaling with primitive weapons made of horn, flint and slate. One Alaskan whaling settlement certainly dated back to 100 or 200 A.D.

The Alaskan Eskimos' whale cult dance indicates how important the whale was in their lives. Before setting out on a whaling expedition a week would be spent in ritual dance with a woman taking the part of the whale; during the hunt, incantations were made and songs sung; after a successful hunt the Shaman, or high priest, would lead the dance of rejoicing; this would be followed by a 3 day "mourning" period of placation, after which came a final feast accompanied by frenzied dancing.

Modern whaling methods really date from the 1860s, when a Norwegian sealing captain, Svend Foyn, invented a new technique for hunting the great rorquals, including the blue whale, which swim too fast for pursuit in open boats. He fitted a harpoon-firing cannon in the bows of a steam vessel and incorporated into the harpoon head a grenade which exploded a few seconds after the harpoon had penetrated the whale's body. Foyn's methods revolutionized whaling and have remained essentially unaltered to this day.

The next big change in whaling came in 1925, when the steamship "Lancing" was fitted with a slipway in the stern by means of which whales could be hauled aboard. This marked the beginning of the factory ship era and opened the way to pelagic (open sea) whaling.



Factory ships could operate for long periods wherever whales were to be found and outside territorial waters in which regulations to curb overfishing were gradually being imposed.

Delivered to the factory ship by a whale catcher, the huge carcass is winched up the slipway to the flensing (butchering) deck where the blubber is removed in enormous strips and the meat removed and the carcass dismembered. It takes little more than 45 minutes to dispose of a 100 ton blue whale.

For a time pelagic whaling was unrestricted, but it soon became evident that blue whales and humpback whales were being seriously overfished. In 1937 and 1938 the governments of Great Britain, Norway and Germany signed agreements to restrict pelagic whaling and in 1946 the International Whaling Commission was set up which most whaling nations joined.

The Commission lays down minimum lengths for whales that may be caught, limits the duration of the whaling season for the different species, allocates areas outside the Antarctic in which factory ships may operate and has named a sanctuary area in the Antarctic which can be opened or closed to whalers at its discretion. Whaling for humpback whales was completely forbidden in 1963 and for blue whales in 1964.

Many experts, however, consider that existing regulations for the control of whaling are still inadequate. In his remarkable book "The Year of the Whale (1)," biologist Victor B. Scheffer has called for much stronger international action. He would like to see control of whaling placed in the hands of the United Nations and firm action taken before certain species of whale become entirely extinct.

His pleading is based on sound common sense. "If we think of whales, not as unique systems, but as packages of oil and protein, we can get along nicely without them," he says. He points out that we could instead gather the sea fodder on which they live, but, "it will not come to us in the wholesale, bargain size of the fifty ton whale."

"The Year of the Whale" is a fictionalized account of the first year in the life of a sperm whale, interspersed with absorbing facts about the biology of the whale, the whale at play, its ability to pick up the "tingling messages" of vibrations and interpret them, the whaling industry and all the folklore and mysticism that surrounds the whale.

But more than this, Scheffer has the

(1) *Charles Scribner's Sons, New York, 1969 ($6.95).*

CONTINUED NEXT PAGE

This 14 foot pilot whale is the star performer at the Marineland oceanarium, California. Until recently oceanariums featured the smaller dolphins and porpoises because of their intelligence. It has been found that the larger pilot whale is hardly less intelligent and can be trained to perform a whole repertoire of tricks. Scientists say that cetaceans (the whole whale family including porpoises and dolphins) are amongst the most intelligent of animals.

Photo © BIPS, New York

YEAR OF THE WHALE *(Continued)*

knack of presenting hard biological facts in terms of sheer poetry as witness this description of a female sperm whale diving to the ocean depths to feed.

"Too long she has dozed in the winter sun, only inches under the surface of the sea. She sighs. She draws a dozen deep drafts of air and then she turns below. Her tail flashes against the blue. She does not sink, she undulates, she presses firmly down. Her heartbeat drops to ten per minute, barely thumping, slow, pumping five gallons at a stroke. The blood retreats from limbs and skin and tail; it keeps alive the massive brain and heart. The red-black muscles of her flesh begin to pour their hidden stores of oxygen into her veins. Now the massive beds of fat begin to serve. Their spongy, oily cells relax and offer up their air. The pressure grows. She continues down. Her body goes in debt for exygen, but not for long. A trillion cells suspend, they tolerate, they hold. For half an hour she feeds and then she pushes to the top to breathe. Her lungs are clean and fresh; their walls are thin. In sweet abandon she sucks the upper air all pure and unpolluted. Her breath is a rustling sound like surf on a smooth beach—a soft sighing music of the wind. It is a sound like no other on the sea. She has fed two thousand feet below and yet survives."

In passages such as this Scheffer succeeds in imparting to us the wonder of a sadly depleted life system. Before depletion becomes extinction and before the genetic pool of our ecosystem is further reduced we must surely listen to the voice of reason and act to preserve this branch of our own family of mammals.

In their ancient whale cult dance the Alaskan eskimos were instinctively aware of this and marked the death of a whale with a "mourning" period. Unless we act immediately the mourning period will become unending.

As Albert Schweitzer wrote in his autobiography; "...man comes again and again into the position of being able to preserve his own life only at the cost of other life. If he has been touched by the ethic of Reverence for Life, he injures and destroys life only under a necessity which he cannot avoid, and never from thoughtlessness. So far as he is a free man he uses every opportunity of tasting the blessedness of being able to assist life and avert from it suffering and destruction." ■

XUM

Letters to the Editor

TRIUMPH ON THE MOON
HUNGER ON EARTH

Sir,

Your issue on the fruit of space research (March 1970) was a great achievement, and the examples given by the author, Gene Gregory are most impressive.

However, while reading the "Unesco Courier" I received another publication in which the Irish National Freedom from Hunger Campaign Committee states "While Apollo II stood on the moon, 36,550 died from hunger on earth." This is also an impressive and challenging fact. Since it was not stated in Mr. Gregory's article, I think you should pass it on to your readers.

A. Perez-Vitoria
Havana, Cuba

MAN THE PREDATOR

Sir,

As a regular reader of your magazine I know that most of its articles deal with great problems and developments in the world. However, I would like to ask you to devote space to a problem that is of special concern to me—the protection of animals.

I know this is a difficult, thankless and often misunderstood effort which, as is often pointed out, takes but second place to the solution of the formidable problems facing Man. But surely we can devote some of our resources to putting an end to the sufferings of helpless animals, so frequently a prey to the cruelty and ignorance of men.

L.A.
La Sarthe, France

The protection of animals and nature has been a constant concern of the "Unesco Courier" during the last 22 years. Issues devoted to this problem include: "Man Against Nature" (January 1958), "Africa's Wildlife in Peril" (September 1961), "Sanctuaries Astride Frontiers" (February 1965) and "The Biosphere, a delicate balance between man and nature" (January 1969) and of course the present issue—Editor.

CLASS PROJECT 'UNESCO'

Sir,

Last week my class arranged an interesting exhibition on Unesco, using posters and booklets with illustrations and articles on many Unesco activities, particularly International Education Year 1970. Copies of the different language editions of the "Unesco Courier" were prominently featured.

Our teacher devoted a lesson to explaining the structure, work and programme of Unesco. I myself prepared the talk under the title "Unesco, What it is, What it does, How it works". Each week we have a lesson prepared by a boy or girl in the class, which is presented and commented on by the teacher.

Tadeusz Gruszkowski
Sopot, Poland

IGNORANCE ABOUT CANCER

Sir,

Your informative articles on smoking and cancer (May 1970) fail to make clear whether or not the inhaling of tobacco smoke makes any difference. This is surely a vital factor.

One of your authors seems to be surprised at the public's ignorance of cancer cures. Ask 100 persons and I'm sure no one will have had any first-hand knowledge of a cured case. People with cancer tend to hide it; doctors are bound by professional secrecy. Cancer cures should be widely publicized in non-specialist journals with a wide readership.

Guy Marquis
Douai, France

The World Health Organization reports to us that smokers who inhale have a much greater chance of getting cancer than those who don't inhale—by far. It has not yet been definitely established why pipe and cigar smoking are less harmful than cigarettes. Two hypotheses have been advanced by medical experts: that pipe and cigar smokers inhale less and that they are inclined also to smoke less—Editor.

A LITTLE SCARY...

Sir,

Your issue on Cancer is most interesting. A little scary too. I find after reading it an ashtray full of half-smoked cigarettes. As I write I'm taking solace in a large cigar. But more seriously... have any studies been undertaken amongst people of an urban Parsee community—say Bombay? Such a study could be revealing. With fire a sacred thing, most Parsees don't smoke, although some younger ones do; but smokers or not they live in a city much polluted by the exhausts of cars, buses and trucks.

Richard Aspinall
Institute of Mass Communication
University of Lagos, Nigeria

WHY TORTURE RABBITS?

Sir,

The harmful, cancer-producing effects of tobacco on the lungs ("Unesco Courier", May 1970) have long been established beyond any doubt by statistics covering many hundreds of thousands of people. So why torture rabbits by making them smoke through masks placed over their muzzles? (photograph in your May 1970 issue) Why continue to inflict cancer upon them? Although one cannot oppose all experimentation on animals, it must be admitted that the limits of what is strictly necessary are exceeded again and again in order to satisfy cruel scientific curiosity.

F. E. Ducommun
Nyon, Switzerland

FRESCOES OF PAESTUM

Sir,

The article in your April 1970 issue concerning the archaeological discoveries at Paestum contains a few errors.

In the caption on page 3 referring to the cover photo you say: "the fresco reproduced in the upper half of our cover depicts a warrior being welcomed home... The standard indicates that this is a Lucanian work as the ancient Greeks never carried standards."

In fact, the warrior in question is carrying the tunic and belt of the defeated enemy. This is clearly visible in the fresco. Furthermore, it was not the custom in Greece to bring back the vanquished enemy's tunic displayed like a standard.

The caption on page 4 concerning the temple at Paestum describes it as being "modelled on the Parthenon". However, it has been definitely established that the Parthenon at Athens was built later than the temple at Paestum and with different aesthetic considerations in mind. See P. Zancani-Monturo, "Enciclopedia dell'Arte Antica" (page 836) and F. Krauss, "Paestum, Die Griechischen Tempel" (page 47).

Alessandro Morandi
Istituto di Etruscologia e Antichitá Italiche, Universitá degli studi di Roma

THE DISAPPEARING WHALE

Sir,

I should like to comment on the letter from J. A. Gulland and S. J. Holt of FAO published in your November 1969 issue. The present plight of the *Balaenoptera Borealis* (the Sei whale) is much more serious than their letter indicates. The FAO report for 1966-67 recorded a 30 per cent reduction in the number of whales in the Antarctic as compared with the previous year. In 1965-66, 17,583 were killed—a third of the overall population. The position of the *Balaenoptera Musculus* (the Blue whale) is almost hopeless. A report of the International Union for the Conservation of Nature and Natural Resources put the total number of Blue whales at between 650 and 1,950 in 1963. The report added: "It is probable that the Blue whale has reached the point at which it will no longer be able to reproduce."

Miguel Gil Corell
Masamagrell, Spain

See article page 65—Editor.

COVER CHARGE

Sir,

It is always a pleasure to receive your magazine which I leave in the sitting room for everyone to look at and read. However my pleasure will diminish if you continue the present unengaging style of your covers.

It is of course right to move with, or even ahead of the times, but as the "Unesco Courier" aims at being a link between a great number of different mentalities, only truly beautiful or humanly striking designs can hope to have this unifying effect. In the past the "Courier" has very seldom been amiss in this. So I ardently hope the last few issues are not indicative of a permanent new line in "Courier" covers.

W. H. Posthumus-van der Goot
Amsterdam, Netherlands

The Editors would welcome other readers' comments on this.

UNESCO NEWSROOM

Preserving Cambodia's monuments

Following a recent Unesco Executive Board resolution calling for efforts "to preserve the monuments of Cambodia's cultural heritage from destruction, profanation and pillage", Unesco's Director General, Mr. René Maheu has held consultations with the countries involved. At the request of Cambodia, he sent Mr. Vadime Elisseef, chief curator of the Cernuschi Museum in Paris, to Phnom Penh, to advise on the application of the Hague Convention for the protection of cultural property in wartime.

Stethoscopes on the Great Lakes

The international Field Year for the Great Lakes, a comprehensive programme of scientific studies of Lake Ontario and its drainage basin, will begin in 1972. It is a joint US-Canadian undertaking and part of the two countries' national programmes for the Unesco sponsored International Hydrological Decade. The Field Year will directly benefit the 35 million North Americans now living on the shores of the Great Lakes, one of which, Lake Erie, is already seriously polluted. By the end of the century the number of lakeside dwellers is expected to reach 70 million.

Making Singapore a cleaner greener city

Smoky vehicles are to be eliminated from Singapore by the end of 1970 so that the Republic can be a "cleaner, greener city..." Measures in the government anti-pollution drive include : liquidation of bus companies involved in 30 pollution offences in a month and transfer of their business to another company with a good record; banning the belching of smoke and fumes from vehicles; setting up a permanent three-man committee to look into pollution problems; a law to prohibit smoking in cinemas and buses.

Lowering barriers to knowledge

The latest teaching equipment from abroad will become more easily available to schools thanks to a Unesco-sponsored convention for its temporary importation recently approved in Brussels by the Customs Co-operation Council. Material covered for classroom use, for training the handicapped and for vocational courses includes programmed teaching equipment, language libraries, closed-circuit television equipment, mobile libraries and study kits.

Passports for art treasures

Recognized art treasures and other cultural property will in future need their own "passports" to leave their country of origin if an international convention directed against illegal traffic in works of art is approved by Unesco's General Conference in October 1970. Approved recently by a committee of specialists representing 60 countries, the control convention would require ratifying states to issue a certificate for each item of cultural property exported.

New power source for heart pace-makers

A revolutionary type of pace-maker for ailing hearts is being developed by the Australian Atomic Energy Commission. Unlike pace-makers currently in use, which are powered by mercury batteries, its power source is the radioactive element Promethium 147. It is one third the size of existing models, and has a life of 10 years compared to less than three.

Computers vs. pollution

Rotterdam, second biggest city of the Netherlands, has completed the first phase of the world's most sophisticated, fully automated air pollution warning system. It consists of 31 electric "sniffers" sited near major industrial plants to monitor sulphur dioxide in the atmosphere. They are linked to a computer, and when sulphur dioxide in the air rises above a certain level, the computer sounds an alarm and an electronic map pinpoints the offending plant.

Site of Socrates' trial unearthed

The ruins of the Stoa of the Basileus, where Socrates was tried and condemned to death has been unearthed by archaeologists excavating in the heart of Athens. Remnants of the stone benches on which some of Socrates' judges may have sat have also been found.

Protecting the African environment

Unesco is to provide assistance in ecology and conservation to African countries through the Unesco Field Science Office for Africa in Nairobi. Kai Curry Lindahl, a well-known Swedish conservationist, and Dr. Hartmut Walter, a German zoologist, have been sent to Nairobi to help set up national parks and biological reserves and to advise on the protection of archaeological sites.

Flashes...

■ *Cars, trucks and buses in the U.S.A. will increase from 104 million to 158 million within the next 20 years according to the U.S. Federal Highways Administration.*

■ *"Consumer Education" was the theme of this year's World Consumer Conference held at Baden, near Vienna, in support of International Education Year 1970.*

■ *An international youth camp organized by the Japanese Committee of the World Assembly of Youth was held at the Osaka World Fair in July.*

■ *Pakistan is to open ten new vocational education institutes for women, including a polytechnic centre at Karachi offering courses in radio electronics, commercial education and dress designing.*

BOOKSHELF

■ **Mathematics Applied to Physics**
Edited by E. Roubine
(The Teaching of Basic Sciences series) 8 articles in English, 2 in French
Co-edition Unesco, Paris - Springer Verlag, Heidelberg 1970 ($14.50, 124/- stg.)

■ **Industrialization and Society**
Edited by Bert F. Hoselitz and Wilbert E. Moore
Co-edition Unesco, Paris - Mouton, The Hague, 1963, 4th impression 1970 ($11, 66/- stg.)

■ **World Summary of Statistics on Science and Technology**
(Statistical Reports and Studies)
Bilingual: English-French
1970 ($2. 12/- stg.)

■ **Islam and the Race Question**
(The Race Question and Modern Thought series)
1970 ($1, 6/- stg.)

■ **Teaching and Learning**
An introduction to new methods and resources in higher education
1970 ($4.50, 27/- stg.)

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■ **International Targets for Development**
Edited by Richard Symonds
Faber and Faber, London
1970 (25/- stg.; cloth-bound 50/- stg.)

■ **An Adventure in Textbooks**
By James M. Reid
R.R. Bowker Co., New York and London
1969 ($7.95 U.S. and Canada; $8.75 other countries)

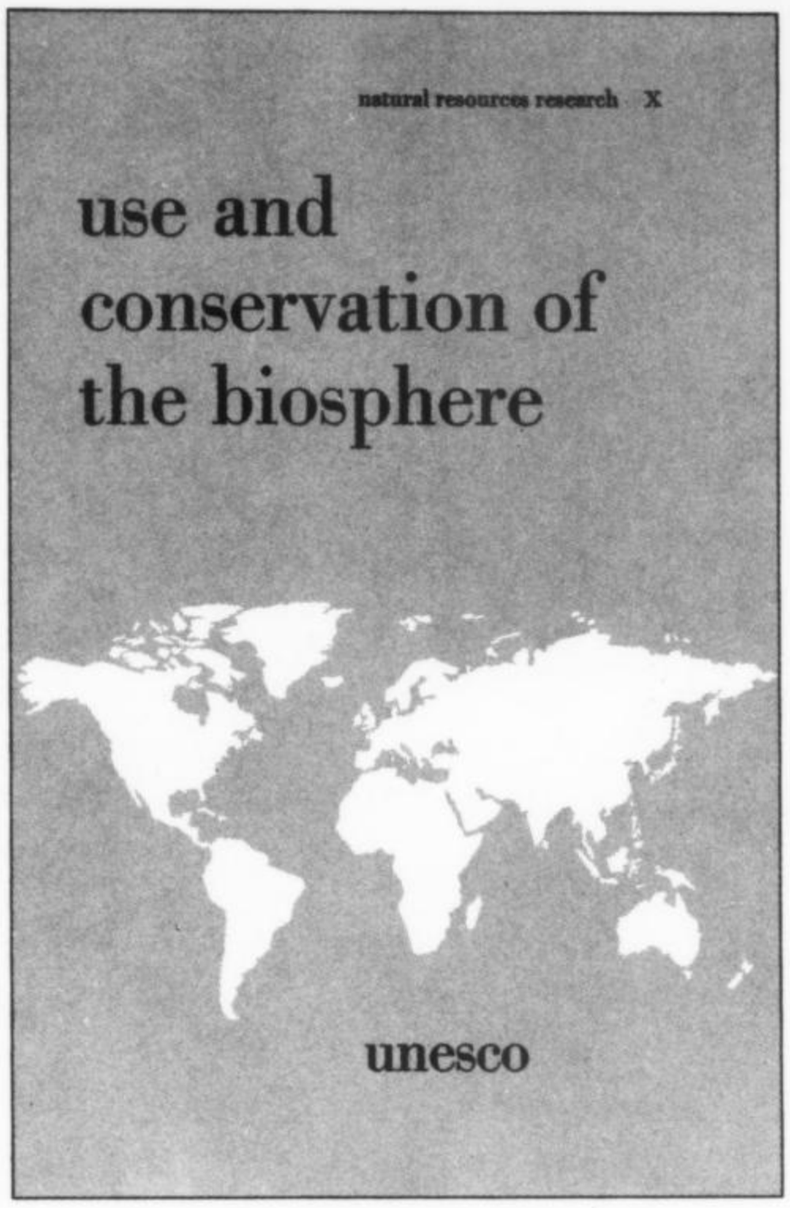
■ **Readings in World Cultures**
By Paul Thomas Welty
J.B. Lippincott Co., Philadelphia, New York, 1970

■ **The Year of the Whale**
By Victor B. Scheffer
Charles Scribner's Sons, New York 1969 ($6.95). See article p. 65.

■ **A Ministry of Education for Europe**
By Anthony Haigh
George G. Harrap and Co. Ltd, London
1970 (30/- stg.)

■ **Call it a Day**
A selection of modern Indian stories
Edited by M.C. Gabriel and Gwen Gabriel
Siddhartha Publications (Private) Ltd., Delhi, 1969
(Rs 8.40, 15/1, $2.00)

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE. — Dépôt légal. 2e trimestre 1970 - C 1



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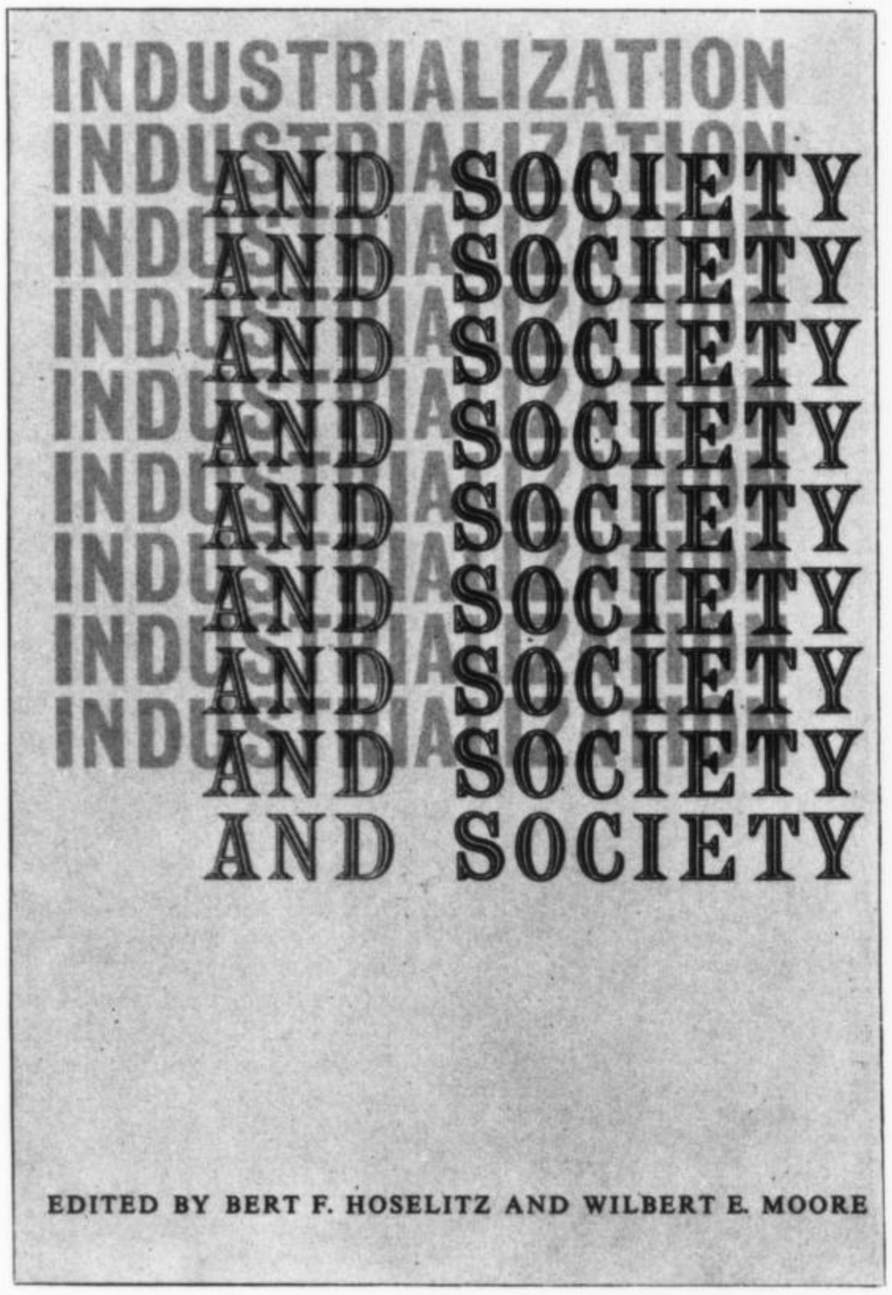

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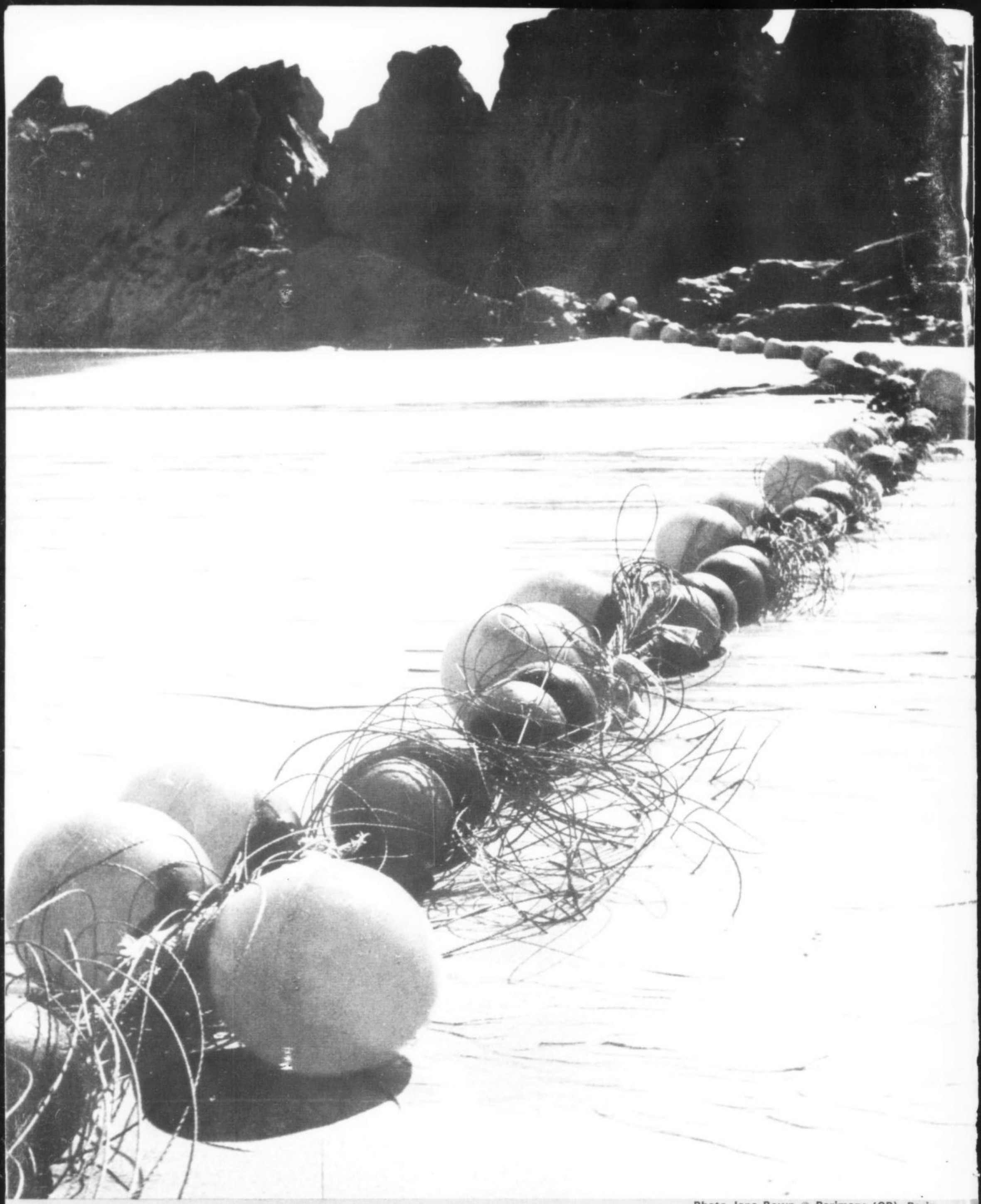

Photo Jane Bown © Parimage (CP), Paris

ANTI-SLICK BARRAGE

After the wreck of the tanker "Torrey Canyon" in March 1967, hastily improvised booms consisting of floats and cables, like this one at St.Ives in Cornwall, formed a protective skirt around Britain's south western coastline, rising and falling with the tides and holding back the oil slicks that threatened to invade beaches, ports and river estuaries. More sophisticated booms consisting of tough, easily assembled plastic sections, now provide a cheaper and more effective weapon against the growing menace of beach pollution by crude oil.

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